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Final report on finish and coating Development for Mauler Weapon Fod

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Jack R. Vede, Jr.

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Charles E. Lyc

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FINAL REPORT ON FINISH AND COATING DEVELOPMENT FOR MAULER WEAPON POD

by

Jack R. Wade, Jr.

and

Charles E. Lyons

DA Project No. 5286. 12. 117

AMC Management Structure Code No. 5262. 12. 11700

Container Design Branch
Ground Support Equipment Laboratory
Directorate of Research and Development
U. S. Army Missile Command
Redstone Arsenal, Alabama

AbSTRACT

The purpose of this project wan to develop one or more protective coatings for the MAULER weapon pod which would protect the exterior surfaces and materials of the pod against the exhaust blasts emitting from MAULER missiles.

This report covers the period of time from 10 July 1964 to 1 July 1965. During this period, 22 materials were evaluated utilizing the actual conditions of MAULER missile firings.

Three materials have demonstrated a satisfactory capability for withstanding MAULER firings. Two of the three materials were subjected to six firing tests white the third material was limited to four firing tests.

The three materials are recommended for use with the MAULER weapon pod and are rated in the order listed below:

- 1) Two-part epoxy matrix-type coating (RSA 64-4-A specimen)
- 2) Epoxy and fiberglass, two-part compound coating (RSA 64-6-A specimen)
- 3) Alkali metal silicate pigmented with inorganic fillers (RSA-64-29-A specimen).

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l. Introduction

The previous efforts by the Ground Support Equipment Laboratory on this project are presented in progress reports RL-TM-63-11, dated 9 August 1963, and RL-TM-64-6, dated 21 July 1964. The purpose of this report is to define project activities and results from 10 July 1964 to their completion on 1 July 1965. MAULER firing tests used in this project were completed 14 June 1965.

2. Discussion

a. Purpose of Study

The purpose of this project was to develop a coating material which would provide the best possible protection for the MAULER pod under conditions of multiple firings (Table I). During missile firings, the top surface areas of the MAULER weapon pod are subjected to extremely high temperatures, pressures, and exhaust blast residues emitting from the plumes of MAULER missiles. These environments introduce severe corrosive and erosive conditions which damage the paint finish and basic materials of the weapon pod.

b. New Materials Tested

In addition to 6 specimen materials further investigated from the previous investigation period, there were 16 new specimens tested. The specimen numbers of the 16 materials tested were: RSA 64-17-A, RSA 64-18-A, RSA 64-19-A, RSA 64-20-A, RSA 64-21-A, RSA 64-22-A, RSA 64-23-A, RSA 64-24-A, RSA 64-25, RSA 64-26, RSA 64-27, RSA 64-28-SS, RSA 64-29-A, RSA 64-30-A, RSA 64-31-A, and RSA 64-32-A. The material sources are outlined in Table II.

c. Total Materials Tested This Period

Twenty-two materials were subjected to firing tests at White Sands Missile Range in New Mexico (Table III). The results of the tests are contained in Tables IV and V, and Figures 1 through 58.

d. Materials Obtained During Period (Untested)

Five test specimens were received from the U. S. Army Coating and Chemical Laboratory, Aberdeen Proving Ground, Maryland. These specimens were received too late to be scheduled for testing. Two of these specimens were damaged in transit between the Aberdeen Proving Ground and the U. S. Army Missile Command at Redstone Arsenal. The data for the five untested specimens are as follows:

Formula	Type
555-1)1	Fiberglass-Epoxy
555-112	Fiberglass-Epoxy
555-113	Fiberglass-Epoxy-Polyamide
555-121	Fiberglass-Aluminum-Epoxy
555-125	Fiberglass-Urethane

In accordance with verbal instructions from the U.S. Army Coating and Chemical Laboratory, the preceding specimens are to be retained by the Ground Support Equipment Laboratory for possible investigation in future projects.

e. Multiple Firing Test (Two or More)

Finish and coating specimens subjected to multiple firing tests at White Sands Missile Range were as follows:

Specimen No.	No. of Firing Tests
RSA 64-4-A	6-2
RSA 54-5-A	2
RSA 64-6-A	
RSA 64-7-A	?
RSA 64-14-A	2
RSA 64-21-A	
RSA 64-29-A	4*

^{*}Selected for three multiple firing tests which were accomplished on 20 April 1965, 22 April 1965, and 14 June 1965. The four specimens were not weighed, micromoter measured, or photographed until after three firings in succession. RSA 64-4-A, RSA 64-6-A, and RSA 64-12-A performed at an acceptable level, whoreas RSA 64-21-A was a failure.

3. Conclusions

a. Pod Protection

The weapon ped firing unit (Figure 59) to be protected includes three areas which receive rocket motor blasts. These areas are as follows (Table VI):

- 1) Areas that receive nearly perpendicular blasts from the missiles at a relatively close range.
- 2) Areas that receive less severe non-perpendicular blasts, usually at greater distances from the rocket motor nozzle.
- 3) Areas that are subjected only to deflected or indirect blast impingement.

b. Methods of Testing

The following were the four basic methods of testing utilized in the overall program:

- 1) Subjecting specimens to mechanical testing.
- 2) Subjecting specimens to small 2-inch rocket static firings at the contractor's facilities, or small rocket firings at Redstone Arsenal.
 - 3) Subjecting specimens to MAULER static firings.
- 4) Subjecting specimens to actual environmental conditions of the MAULER firing unit at White Sands Missile Range in the following order:
 - a) Promising specimens -- single firing tests.
- b) Best promising specimens -- two or three firing tests.
- c) Best performing specimens -- multiple firing tests,

NOTE: Tests performed during the period covered by this report were limited to method 4) above.

c. First Specimens Selection

Specimens subjected to firing tests during period 10 July 1964 to 14 June 1965 were the most promising materials investigated by MICOM. The 22 materials tested during this period were first subjected to a single firing test on the MAULER firing unit before a selection was made of the best performing materials. Those specimens with the highest amount of coating erosion, bonding failures, and other unsatisfactory conditions were disqualified after the first firing test or after subsequent firing tests.

d. Final Specimens Selection

The final selection of specimens for multiple firing tests was made on the basis of coating weight loss, coating percentage loss, condition of coating surface, bonding adherence to substrates, and the availability of remaining firings (Tables VII through XXIX and Figure 60). Some materials showing promise were diaqualified in favor of other materials because the testing program from 1 April 1965 to 14 June 1965 limited the number of specimens which could be tested. As a result of an evaluation to determine the best performing materials, four specimens, RSA 64-4-A, RSA 64-6-A, RSA 64-12-A, and RSA 64-29-A, were selected and tested.

e. Specimen Arrangement

Tests conducted at White Sands Missile Range consisted of specimens arranged in clusters of four with the coating substrate panels bolted to test fixtures attached to the firing unit structure (Figures 61 and 62).

f. Conditions

Tests conducted at White Sands Missile Range were confined to one area of the firing unit in order to assure:

- firing unit would be subjected to equivalent test carditions.
- 2) A maximum number of materials could be tested with a minimum number of firings.

g. Acceptable Specimens

Three of the four specimens subjected to successive multiple firing tests, 20 through 22 April 1965 and 14 June 1965, are considered

to have performed on an acceptable level (Table VII). These are RSA 64-4-A, and RSA 64-6-A, which were subjected to a total o. six firings, and RSA 64-29-A, which was subjected to a total of four firings. Specimen RSA 64-21-A was disqualified after subjection to its fourth firing test. All three of the successful specimens are considered to generally meet the prerequisites established for the program. The first two of the successful specimens were materials applied by trowel, whereas the third successful specimen was a material requiring spray application. Specimen RSA 64-4-A was rated above specimen RSA 64-6-A because there were indications of minor bonding failures at two corners of the latter specimen, which were not apparent until after the sixth firing test.

h. Solution

Although three of the candidate materials investigated have shown acceptable results when tested by actual firings, a better solution to the weapon pod deterioration problem would be a factory applied finish and coating capable of withstanding missile blasts for the life of the weapon pod. When future finish and coating developments are made, those materials which have shown promise, but which were disqualified in favor of other more promising materials, should be reinvestigated and subjected to multiple firing tests.

4. Recommendations

a. Field Application

If the MAULER weapon pod is to be protected by finishes and coatings which can be applied and repaired in the field, the following protective finishes and coatings are recommended in order of preference:

- 1) RSA 64-4-A. Two part epoxy matrix-type coating. Commercial designation: PT-2090 Heat Glaze (see Table XXX for description), Products Techniques Incorporated
- 2) RSA 64-6-A. Epoxy and fiberglass, two part compound Commercial designation: 7594Y41 Twin Weld (see Table XXX for description), Schraum Products, Incorporated
- 3) RSA 64-29-A. Alkali metal silicate pigmented with inorganic fillers. Commercial designation: WSX-5833, Inorganic high temperature coating for missile applications (see Table XXX for description), ENJAY Chemical Company.

b. Further Research

This project should be continued for further evaluation of the three materials recommended above, and the best six of the remaining investigated group, when subjected to a greater number of multiple firings. If additional MAULER firings are not available for continuing the project, other similar test missiles should be used.

A new project should be undertaken to develop factory applied materials, finishes, or both, which are capable of withstanding actual missile blasts for the service life of the MAULER weapon pod. These developments are needed to eliminate field application and repair.

Table I. Coating Prerequisites

General Requirements

- 1. Coating application should be limited to a maximum three step operation. A single step operation, if feasible, is highly desirable.
- 2. Coating application should be easy and simple under field conditions with the use of common tools by Army personnel having a minimum of training in application technique. Application of the protective coating by means of either a brush, trowel, or by spray method is desired.
- 3. The coating material must cure within 16 hours or less after application without the use of supplementary heating equipment. If necessary, drying agents such as amine may be added to the basic compound(s) for expediting curing time. Coating compounds and drying agents must be compatible.
- 4. The ingredients of the coating material shall be capable of bonding together and adhere strongly to the aluminum surfaces of the weapon pod.
- 5. Weight of the coaing compounds after application and curing shall not exceed 1.5 pounds per square foot. A coating material weighing less than 1.1 pounds per square foot is desired in order to minimize additional weight on the weapon pod.
- 6. The color of the finished coating compound should match as nearly as possible the color of the weapon pod. Coating compounds, developed locally or obtained from any source, should either be colored olive drab or should be capable of being colored by the addition of non-oily type olive drab pigment.
- 7. The developed coating when applied shall be capable of withstanding high temperatures of 2000°F to 6000°F, pressures ranging from 100 psi to 400 psi, and the effects of alumina-propellant particles during the blastoff of MAULER missiles for time periods up to 1/8 second. Either a single firing or multiple firings at a stable azimuth and elevation position, or a varied combination of azimuth and elevation positions, are highly probable under tactical situations. Blast impingement points on the weapon pod will vary from 8 to 26 inches under the above stated conditions.

Table I. (Concluded)

- 8. The final coating finish should have a nonskid type surface when wet. This type surface is particularly desired for safety of personnel when walking on areas of the weapon pod that are coated with the protective coating material.
- 9. The developed coating should be easily repairable as a field fix under tactical conditions, when required, by utilizing identical materials and techniques employed for the initial application of the coating.

Table II. Material Sources and Designators

	Specimen	Source
1.	RSA 64-4-A (Prepared by GSE Lab)	Product Techniques Incorporated Los Angeles, California (AA)
2.	RSA 64-5-A (Prepared by GSE Lab)	Dyna-Therm Chemical Company Burbank, California (BB)
3.	RSA 64-6-A (Prepared by GSE Lab)	McMaster-Carr Supply Company Chicago, Illinois (CC)
4.	RSA 64-7-A (Prepared by GSE Lab)	Deveon Corporation, Danvers, Massachusetts (DD and Ground Support Equipment Laboratory, Redstone Arsenal, Alabama (EE)
5.	RSA 64-14-A RSA 64-15-A (Prepared by C&C Lab)	U. S. Army Coating & Chemical Laboratory, Aberdeen Proving Ground Maryland (FF)
6.	RSA 64-17-A RSA 64-18-A RSA 64-19-A RSA 64-20-A (Prepared by Supplier)	Lord Manufacturing Company Erie, Pennsylvania (GG)
7.	RSA 64-21-A RSA 64-22-A RSA 64-23-A RSA 64-24-A (Prepared by Supplier)	Raytheon Manufacturing Company Lowell, Massachusetts (HH)
8.	RSA 64-25 RSA 64-26 RSA 64-27 (Prepared by GSE Lab)	Raybestos-Manhatten Company Manheim, Pennsylvania (!I)
9.	RSA 64-28-SS (Prepared by GSE Lab)	National Aeronautics & Space Adminis- tration, Redstone Arsenal, Alabama(JJ)
10.	RSA 64-29-A RSA 64-30-A (Prepared by Supplier)	ENJAY Chemical Company Division of Humble Oil Co. New Orleans, Louisiana (KK)
11.	RSA 64-31-A RSA 64-32-A (Prepared by Supplier)	Thiokol-Alpha Division Redstone Arsenal, Alabama (LL)

Specimen No.	lstTest	2nd Test	3rd Test	4th Test	5th Test	6th Test
RSA 64-4-A	11 Jun 64	75 Jul 64	8 Oct 64	co Apr 05	22 Apr 65	14 Jun 65
RSA 64-5-A	11 Jun 64	22 Jul 64				
RSA:64-6-A	11 Jun 64	22 Jul 64	8 Oct 64	20 Apr 65	22 Apr 65	14 Jun 65
RSA 64-7-A	11 Jun 64	22 Jul ·64				
RSA 64-14-A	25 Jun 64	8 Oct 64				
RSA 64-15-A	25 Jun 64	8 Oct 64				
RSA 64-17-5	11 Dec 64					
RSA 64-18-A	11 Dec 64					
RSA 64-19-A	11 Dec 64					
RSA 64-20-A	11 Dec 64	-				
RSA 64-21-A	17 Dec 64	20 Apr 65	22 Apr 65	14 Jun 65		
ESA 64-22-A	17 Dec 64	~~.~				
RSA 64-23-A	17 Dec 64				a session of	
RSA 64-24-A	17 Dec 64					
RSA 64-25	13 Jan 65					
RSA 64-26	13 Jan 65				-	
RSA 64-27	13 Jan 65					
RSA 64-28-SS	13 Jan 65					
RSA 64-29-A	4 Feb 65	20 A. = 65	22 Apr 65	14 Jun 65	-	
RSA 64-30-A	4 Feb 65			•		
RSA 64-31-A	4 Feb 65					
RSA 64-32-A	4 Feb 65					

NOTE: Twenty-two materials tested under actual MAULER Firings.

2 subjected to 6 firings 2 subjected to 4 firings 4 subjected to 2 firings 14 subjected to 1 firing

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Table IV. Protective Coatings Tested at White Sands Missile Range

		ř					
Specimsn	Company	Material , Identifier	Method at Application	Coating Average Thickness (in.) (Nominal)	Maximum Remova. (% by Wt.)	Approximate Material Makeup	Remarks
RSA 64-4-A	¥	PT-2090	Trowei	3/16	65.35%	Two-part epoxy matrix type coating	Selected for multiple . fixing tests., Maximum removal after 6 fixings.
85A 64-5-A	eg Eg	E-300	Trowel	3/16	29.37%	Flexible epcxy based compound two-part thix stropic paste	Disqualified due to weight loss and significant coating failures after second firing.
88. 64.6.5	8	7594741	Trowel	3/16	37.50%	Epoxy and fiberglass two-part compound	Selected for multiple firing tests. Maximum removal after 6 firings. Slight bond separation at 2 corners.
85A 64-7-A	DD & BE	Epoxy filled a substitute compound	Trowel	3/16	29.30%	Epoxy, stainless steel hardener and silicate (approximately 50 mesh)	Disqualified due to weight loss and significant coating failures after second firing.
RSA 64-14-A	įri Įri	. CCL 480-1,062	Trowel	3/16 to 1/4	23. 14%	Flexible type epoxy resin with filler.	Specimen disqualified in favor of other more promisting materials having lower weight loss (2nd firing).
RSA 64-15-A	[4 [4	CCI 480-1063	Trowel	3/16 to 1/1.	41.50%	Flexible type epoxy resin with filler	Disqualified due to coating separation at lower right corner and upper right side (2nd firing).
RSA 64-17-A	បូ	336-1516-(8)	Mold	3/16	2.55% .	Silicone elastomeric ablative compound	Disqualified due to bonding failure after first firing.
RSA (4-18-A	9	336-1949-(9)	Molá	3/16	6.85%	Silicone elastomeric ablative compound	Disqualified due to bonding failure after first firing.
RSA 64-19-A	9	336-1650-(0)	Mold	3/16	2.31%	Silicone elastomeric ablative compound	Disqualified due to bonding failure after first firing.
R\$A 64-20-A	9	336-1651-(1)	Mold	3/16	7.20%	Silicone elastomeric ablative	Disqualified due to bot ding failure after first fixing.
RBA 64-21-A	題'	2140	Sprayable	3/16	95.10%	Filled epoxy resin (elastomeric)	Selected for multiple firing tests. Disqualified after fourth firing (Coating dis-
_							integrated).

Table IV. (Concluded)

Specimen	Company	Material	Method of	Coating Average Thickness (in.)	Maxdmum Removal	Approximate	
Member	Designation	Identition	Application	(Mornings)	(% by vit.)	dnawaw recrame	Konara
RSA 64-22-A	HH	2145	Sprayable	3/16	6.55%	Filled epoxy resin (medium)	Disqualified in favor of other materials. (Merits further investigation)
RSA 64-23A	HH	435	i Sprayable	3/16	10, 18%	Filled epoxy resin (most rigid)	Disqualified due to material chipping and slag condition.
RSA 64-24-A	HII	2138	Trowel	3/16	19.20%	Filled epoxy resin Two-part compound	Diaqualified after first firing due to high percentage coating loan.
RSA '54-25	Ħ	RNÁ 45 RPD	Bolted	1/4	0.73%	Composition board slate.	Disqualified due to brittleness and extensive carbon and burr buildup.
RSA 64-26	Ħ	RM 22 RPD	Bolted	1/4	12/84%	Composition Board	Disqualified offer first firing. Specimen approximately 80% destroyed.
ESA 64-27	Ħ	RM 110 RPD	Bolted	1/4	2. 45%	Composition Board	Disqualified. Heavy buildup of carbon which scales easily, presenting a hazard.
RSA 04-28-SS	ני	17-4-PH	Bolted	1/4	0.25%	Stairless Steel	One firing test; tested as a blast shield material.
RSA 64-29-1	KK	WSX-5833	Spray	1/4	23, 10%	Alkali metal silicate pigmented with inor- ganic fillers	Selected for multiple firing tests. Maximum removal after 4 firings.
REA 64-30-A	KK	M-970C-Q.I	Sprity	1/4	0.00%	Alkali metal silicate pigmonted with inor- ganic fillors.	Disqualified after first firing. Coating separation from substra 2 (40% area).
RSA 64.31.A	र्ग	Laboratory Prepared	Trowel	1/4 to 3/8	1.10%	Calciun oxide base carbon and fillers	Specimen disqualified. Separration of coating at left side of substrate.
REA 64-32-A	7.7	Laboratory Propared	Trowel	1/4	46.45%	Calcium oxide base carbon and fillers	Specimen disqualified. Coating damaged to extent micrometer measurements meaningless.

Table V. Basic Weights and Weight Losses

-		- 3	l		311 33000	weights and weight Loss	מייי ביגאיי	essor 1	ສ			
-		inicia?	Weight ((Grams)		ပိ	Coating Lo	Loss (Grams	ms)			
	i				lst	Snd		4th	5th	6ta	Total	Total
	Specimen	Substrate	Coating	Combined	Firing	Firing	Firing	Firing	Firing	F. ring	Wt. Los:	% Loss
RSA		422.0	127.0	549.0	24.1	7.5	19.1			22 4	0.20	26 27
<u>저</u>	RSA 64-5-A	422.0	98.4	520.4	10.5	18.4				k 3		o c
RE	RSA 64-6-A	422.0	8.06	512.8		17.0	2,5			0	7.07	27.57
RSA	A-1-49 W	422.0	115.4	537.4	27.9	5					7.00	37.30
RSA	A 64-14-A	422.0	133.7	ė	12.6	, ,						
RSA	A 64-15-A	422.0	ci.	522.0				•	***********			
RSA	A-11-49	422.0	97.8	0							_	41.50
RSA	A 6418-A	422.0	86.1	508,1							. v	4.55
RSA	A 64-19-A	422.0	80	530.0	2.5					-		5.80 9.80
RSA	A 64-20-4	1 422.0	87.5	509.5			er Polygan					
RS	RSA 64-21-A	422.0		532.5			-	C				7.20
RSA	A 64-22-A	422.0		530.4	1			000	-		•	
RSA		422.0		7 22 2								6.55
A.S.A		422.0	Š	7,000	• 🛪			-				10.18
RSA	_	246 4		247.0				a			24.5	19.20
AS A		25.5	· c	7 C C C C C C C C C C C C C C C C C C C								0.73
E 3.4		27%	, c	3 0	33.6			~~~			33.2	12.84
RS.A		1132.3	000	1132.3	- a					-	6.7	2.45
RSA			47.0	433.	· ·			 C			8 . 6	· ·
, ,			•	,) ;		****		· ·		•	ار م م	23.10
RSA	A 64-30-A	386.0	49.3	435.3	+ 2.1		**************************************					
	area area				(Gain)			y	···	-		S.
S.	RSA 64-31-A	422.0	246.2	668.2	2.7						,	-
RSA	A 64-32-A	422.0	155.2	577.2	75.2	€ `~~~					7 2	7 . 7
		No. Argentine Commence of the	ATT STATES AND THE SAME OF A STATE OF THE STATE OF THE STATES OF THE STA	-	T	Ţ			-		;	

Table VI. Firing Quadrant Elevation (QE) and Impingement Distance

Firing Number	Fir'ng Designation	Missile QE (Horizontal)	Specimen QE (Vertical)	Impingement Distance
1	STV-9	45.0°	45.0°	12.0"
2	C FV-10	45.0°	45.0°	12.00
3	RTV-6	30. U°	45.0°	14.0"
4	BTV-10	48.0°	45.G°	14.375"
ő	GTV-13	40.5°	45 0°	13.0"
6	BTV[1	52.0°	45.0°	13.0"
	GTV-14	48,61	45.0°	1-3.0"
8	GJ.A*14	25.0°	45.0°	10.0"
3	GTV-20	23.0°	45.0°	10.0"
10	GTV-27	43.0°	45.0	11.75 ⁿ

Table VII. Material Characteristics and Description (Three Best Performing Specimens Tested)

RSA 64-4-A

100% solids, two component spoxy material. Pigments in the matrix are the type used in fire retardant coatings. Component "A" is white and of 100% solids. Component "B" is of 100% solids heavy grey paste. The components are mixed equal parts by volume; tro-el application; pot life three hours: cure time 12 hours or overnight (accelerated curing can be achieved at 180°F for 1 hour by using heat lamps). Weight per gallon - 11 pounds. The cost of this material is approximately \$60.58 per 2 gallon kit (discount of 10% on orders in excess of 50 gallons). Available in clive drab color by adding pigment.

RSA 64-6-A

Material is a balanced combination of epoxy resin, hardeners, fillers, etc., regularly specified by NASA in satellite programs. Available in olive drab if specifically ordered in sufficient quantity. Pot life at 25°C ranges 3 to 4 hours. 3/16 inch coating dries in 5 to 6 hours. Two component compounds, "A" and "B" mixed equal parts by volume. Weight per gallon - 10 pounds. Materials can be furnished in 1/10 gallon caulking tubes, 5 gallons of component "A" and 5 gallons of component "B" in a 10 gallon pail. Similarly, a combination of 7 3/4 gallon and 15 1/2 gallon pails could be used with each pail containing 7 1/2 gallons. 55 gallon open head drum. The approximate cost of the material is \$31.10 (500 gallons), \$30.20 (1000 gallons), \$29.15 (1500 gallons), \$26.35 (3500 gallons), \$25.20 (4500 gallons), \$21.80 (5000 gallons). Materials supplied in 55 gallon open head drums, one component to be so pigmented that the color, when the two components are mixed, will be olive drab.

RSA 64-29-A

100% inorganic self-curing, hard-drying, heat resistant protective coating. Two components "A" and "B" required to be premixed prior to use. Available in two one-gallon compartments -- compartment "A" of WSX-5833 is self-curing aqueous alkali metal silicate vehicle, compartment "B" is a specially compounded mixture of powders and dusts imparting solids --LD-3058 special alkali silicate solution 31.7 wt %, other inorganic pigments 20.4 wt %, zinc dust 47.9 wt %. Weight per gallon - 20.13 pounds. Spray gun application. Available in green ceramic pigments (not clive drab). A version of clive drab is available. Drying time -- 5 hours at 75°F (50% R. H.), 2 hours at 90°F (30% R. H.),

Table VII. (Concluded)

15 - 24 hours at 50°F (90% R.H.). Estimated veight (cured state) -- 0.09752 pounds per square foot (4 mils). Cost of materials in quantities of 500, 1000, 1500, 2500, 3500, and 5000 gallon late (FOB New Orleans, Louisiana) have no firm price. According to supplier, the cost will be approximately \$25.00 per gallon.

Table VIII. Detail Weight and Measurement Data RSA 64-4. A

	-				Weig	Weight Data (Grams)	ram#)							
Substrate 422.0				Coating	127.0			Wei	Weight Lone			Parce	Parcents se Loss	
After Tost 1 422. 3					102.9				24.1					
After Tuet 2 422.0					95.4				7	7.5				
After Test 3 422.0					76.4				19.0					
After Tost 6 422.0					44.0				32.4	*				25.39
						S	Specimen Stations	tations						
Moasurements		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	K. 13
Before Firing Test No. 1	 :-	.436	.411	.418	.425	.426	. 432	.426	.425	.426	. 423	. 432	**	.428
After Fixing Test No. 1	-	. 395	. 382	• 400	. 408	.387	396	.381	. 393	165,	. 392	. 407	. 425	424
Loas		041	029	018	017	039	036	045	., 032	-, 035	031	025	019	
					Te	Tested at White Sanda Missile Range 11 June 1964	ifte Sando	Missile	Range 11	June 1964				
Before Firing Test No. 2	8	. 395	. 382	.400	.408	.387	.396	. 381	. 393	, 391	. 392	. 407	. 425	. 424
After Firing Test No. 2	27	. 114	.384	. 393	.390	.376	.385	.377	. 385	.377	.397	166.	. 40)	421
Less or Sain		.019	200.	007	018	011	011	004	008	-, 014	013	016	02 1	003
n					Te	Testnd at White Sands Missiln Range 22 July 1964	nite Sandi	Missila	Range 22	July 1964				
Before Firing Test No. 3	٠. س	.414	. 384	.393	.390	.376	. 385	.377	. 385	.377	. 379	. 391	. 401	. 421
After Firing Test No. 3	3	.395	300	.371	.387	.366	. 382	. 365	.301	.370	.376	.390	398	. 416
Loss		039	024	022	003	010	003	- 012	034	007	-, 003	001	003	005
					He	Tested at White Sands Missila Range 8 October 1964	ulte Sands	Missila	Range 8 C	ctober 19	3 5			
Before Firing Testa 4, 5, & 6	, 5, & 6	, 395	.360	.371	. 387	996.	. 382	. 365	.381	.370	.376	. 390	. 398	.416
After Firing Tests 4, 5, & b	5, 8, 6	. 332	. 237	. 296	. 329	.305	.337	. 309	. 334	1321	.316	. 32,	. 332	.351
Loss		063	073	· 075	-, 058	061	- 045	055	047	049	060	063	066	065
				Teste.	d at Whit	Touted at White Sands Misuile Range 20 Apr. 22 Apr. 2, 14 Inc. 1065	invite Re	nge 20 An	r. 22 Ap:	. S. 14 Ju	1965			·

Romarks: Pitting of unterial ranged from slight to medium during six firing tasts. Appearance of material after six firing tests is superior to all specimens tested. See TABLE VII for mayorial characteristics.

Table IX. Detril Weight and Measurement Data RSA 64-5-A

				Weig	Weight Data (Grame)	irame)							
Schottato 622.0			Coeting 98.4	98.4			Well	Wuight Loss			Perce	Percentago Loss	
Attor Teat 1				87.9				01	10.4			-	10.7
After Tout 2				69.3			;	.18.4	4			1	18.67
						Specia	Specimen Stations	3.0					
Mesmarements	No. 3	14o. 2	No. 3	No. 4	No. 5	No. 6	No. 6 No. 7	No. 8	No. 8 No. 9	No. 10	No. 10 No. 11	No. 12	No. 13
Before Fliting Tort 180. 1	. 428	.436	. 422	.497	.462	.418	.428	.410	. 406	. 406	.412	.410	. 425
After Fishing Tost No. 1	. 405	.434	.399	. 393	, 4 C,	.390	. 393	.413	.397	. 429	.397	. 386	. 408
Line or Gata	025	022	023	014	. 000	028	035	. 003	009	. 023	-, 015	-, 024	017
				Test	ed at WL.	to Sande	Tested at WL to Sands Missile Range 11 June 1964	ange 11 J	'une 1964				
Before Firmy Test No. 7.	.403	,414	. 399	.393	.412	.390	. 393	.413	.397	.429	.397	. 386	. 408
After Pring Test No. 2	.386	. 395	. 398	.369	.387	.360	.375	. 393	. 375	* 0 * ·	. 260	. 362	. 338
Loss	-, 017	019	001	324	015	030	. 018	020	022	-, 025	137	024	020
				Tont	the se par	te Sands	Tasted at White Sands Missile Range 22 July 1966	ange 22 J	'uly 1966				İ

Remarke: Coating material severely damaged at center right portion of specimen; deep pitting approximetely 3/16 inch diameter by 1/8 inch depth occurred at three separate areas of the specimen. Coating material specimen disqualified.

Table X. Detzil Weight and Measurement Data RSA 64-6-

Ş

Substrate 427. ()			Coating 90.8	90.6	.8		Fa A	Weight Loan	ļ		6			
After Tast 1 422.4				85.0					a			raceumlle Loss	;	
After Test 2 422.0				68.0				, ;					0.39	
After Test 3 422, 0	············							7.0	2			-	18.7	
				ຄຸດ				74	2.5				0.27	
After Teat 6 422.0				55.5		:		οÑ	5.6				12.14	
						Space	Speciaten Stations	36						1
Mansuroments	Na, 1	. No. 2	No. 3	No. 4	No. 5	ž,	No. 7	No. 8	710. 9	No. 10	No. 11	No. 12	No. 13	7
Before Firing Test No. 1	. 403	. 423	.411	.411	. 401	.4:	. 402	. 387	. 432	400	404	354	367	$\overline{}$
After Firing Test No. 1	814.	.414	.410	. 395	. 398	. 404	. 422	. 412	404	. 408	. 427	717	418	
Loss or Cain	. 015	000	001	016	003	- 007	. 020	. 025	628	800	. 018	. 032	. 017	
		•		To	Tosted at White Sands Missile Range 11 June 1964	ite Sand	Missile	Range 11	Fune 1964					_
Before Firing Tert Ito, 2	.418	.414	.410	.395	. 398	. 404	. 422	.4:2	404	. 443	. 427	416	414	
After Ciring Tent No!	.397	966.	.396	.388	. 388	.397	.418	. 407	. 462	. 401	. 428	. 405	410	
Loss or Cain	023	018	014	- 003	010	007	004	-, 005	002	007	100.	. 011	004	
				To	Tosted At White Sands Missile Range 22 July 1964	dte Sand	Missile	Range 22	July 1964					
Before Firing Test No. 3	.397	. 396	.396	.388	.386	. 397	.418	.407	. 402	. 401	. 42.8	. 405	. 410	
After Firing Test No. 3	.397	.381	. 367	. 382	.379	346.	.415	. 404	. 402	.401	. 423	404	.410	
Loss	80.	015	-, 009	2.006	- 000	001	003	003	, 600	000.	005	001	. 000	
				Test	Tested at White Sands Missile Range 3 October 1964	Sands)	dissile Ra	inge 8 Oct	ober 1964					
Before Firing Tests 4, 5, 8 6	.397	.381	. 387	.382	.379	396	.415	. 404	. 402	. 401	. 423	404	410	
After Firing Tests 4, 5, & &	.329	. 307	.376	.321	.324	.334	, 355	.349	. 353	, 358	.391	. 390	377	
Loss	068	074	013	061	055	-, 062	060	-, 055	049	043	032	914	033	
			Tasted	at White	Tested at White Sands Misnile Bunge 29 Apr. 22 Apr. 22 Apr. 22	soile Ray	19e 20 Ap	r. 22 Anr	14 7	3701				

Specimen material remained semi-flexible throughout elss firing tests. Bonding failure at upper left and lower right corner observed after sixth firing test. Appearance of specimen material is considered to be acceptable and is rated as the second best performing material tested. See TABLE VII for material characteristics. Remarks

1 1 1 E

Table XI. Detail Weight and Measurement Data RSA 64-7-A

					Wolght 2	Weight Data (Grame)	(eta						
Sabstrate 422.4; After Tost 1 422.0 After Tost 2 422.0			Coath	Coathag 115.4 87.5 81.6	i .		}	Wolght Lons	27.9		Perce	Percentage Loss	
						996	Specimen Stations	e do					1.5
Measurementa	Nc. 1	Mc. 2	No. 3	No.	No. 5	No. 6	No. 7	2		:			
Before Firing Test No. 3	406	906	1						NO. y	No. 10	No. 11	No, 12	No. 13
		•	. 200	348	. 394	.398	. 405	. 373	. 412	.380	. 438	429	304
Alter Virling Teat No. 1	.364	\$5%	.361	. 369	. 368	. 359	.367	.361	.354	378	202		
Loss or Gain	043	. 039	025	-, 029	026	-, 039	. 038	013	-, 058	200	, i	£ .	604
									}	300	¢.	026	. 625
				Jeete	Tested at White Sands Missile Range 11 June 1964	M spars	fiestle Ra	nge 11 Ju	ne 1964				
Botore Firing Test No. 2	.364	.3.39	.361	. 3ti9	. 368	.359	. 367	. 361	354	378	363	6	- 5
After Fling Test No. 2	.347	. 327	.279	. 34.3	. 338	.340	336	.333	924	778			60.
Loss	017	032	082	-, 026	030	019	031	eza	,030	034	021	. 374	. 030
				Test	Tented at White Sands Missile Range 22 July 1964	Sande N	tienilo Ra	nge 22 Ju	dy 1954				
S													

Remarks: Material separated from substrate the full lengur of the luft side (varying in width 1/4 inch to 1/2 inch); at upper edge, and at right center edge. Weight lows and material failures significanted disqualification. Specimen disqualified after second firing test.

Table MII. Detail Woight and Measurement Data RSA 64-14-A

				W.	Weight Data (Grame)	(Grams)								
Substrate 422.0			Costing 154.0	134.0			Weight Lons	Less			Percen	Percentage Loss		
After Test 1 422.0				141.4				12,6	•			~	7.5	
After Test 2 422.0				117.9				23. 5	ıo.			15	15.94	
					Sp	Specimen Stations	tations							
Measurements	No. 1	No. 2	No. 3	No. 4	No. 5 No. 6	No. 6	No. 7	No. 8	Wo. 9	No. 10	No. 11	No. 12	No. 13	
Before Firing Tast No. 1	. 399	. 440	, 346	.460	. 438	. 450	.458	.409	. 434	.432	.406	.436	. 423	
After Firing Test No. 1	363	. 421	.355	**	. 429	. 438	. 450	. 404	. 432	.430	.406	. 434	. 363	
Loss or Gain	014	£.019	- 000	016	009	-, 912	008	005	002	002	. 000	002	. 090 -	
				Test	Tested at White Sands Missile Range 25 June 1964	Sande A	dissile Ra	mge 25 Ju	me 1964					
Bufore Firing Test No. 2	. 385	.421	, 355	4	. 429	. 438	.450	. 404	. 432	. 430	. 406	. 434	.363	
After Firing Test No. 2	.313	. 383	306	.416	.	.424	.425	. 404	.411	. 408	. 405	.411	. 343	
Loss or Gain	072	038	- 049	028	025	014	025	000	321	-, 022	001	023	020	
	·			Test	Testod at White Sanda Missila Range 3 October 1964	Sands h	lissila Rc	nge 3 Oct	tobar 196					

Minor to slight seosion at top lait center of specimen; slight to medium evosion at both lower corners of substrate in area of washers. Evinon No. 1 revesis a total loss of .072 inch after second fixing tast. Specimen disqualified in favor of two other materials (RSA 64-21-A nd RSA 64-29-A) which pe formed exceptionally well during first fixing test. Remerke:

Table XIII. Detail Weight and Measurement Data RSA 64-15-A

No. 13 . 002 . 324 -. 028 Percentage Lous No. 12 -. 023 No. 11 . 002 No. 10 Tested at White Sands Missile Range 8 October 1966 Tosted at White Sands Missile Range 25 June 1964 No. 5 30.2 Wolght Lass Wedght Data (Grams) .350 08.7 58.5 Coating 100.0 No. 4 .361 -. 033 No. 3 -. 070 . 351 . 281 No. 2 . 327 No. 368 .360 . 883 . 360 . 322 -. 038 Before Firing Test No. 2 Before Firing Test No. 1 After Wiring Tet: No. 1 After Firing Test No. 2 After Test 1 427.0 After Test 2 423.0 Loss or Gain Loss

Remarks: Severa scaling and separation of coating from substrate in lower right corust and upper right side. Specimen disqualified due to prenounced separations.

Table XIV. Detail Weight and Measurement Data RSA 64-17-A

Substrate 422 A				Wolg	Wolght Data ((rams)	(rams)								
-			Coating 97.8	97.8			7≉	Weight Loss			Perc	Percentage Loss		-
								2	2.5			•	2.55	
Makanemante					S	Specimen Stations	Stations							
	No. 1	No. 2	No. 3	No.	No. 3 No. 4 Nr. E									
Bofore Firston Tree Ha					5	100.	No. 7	No. 8	No. 9	No. 10	i.	No. 0 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12		
7 '01' 1804 9	.413	.418	.417	.412	717							110. 12	No. 13	
After Fixing Test No. 1	Ž	;		!		.413	. 414	.415	.415	.413	.418	. 415	420	
	CT	074.	. 415		.412	.413	.416	414	410	9			}	
Coss or Cain	. 002	602	002	00	3				2	Ď.	419	. AU3	.411	
				}	*00 ·	o,	.002	001	008	005	.001	612	009	
	Ì			Test	ed at Whit	e Sands A	(issiže R	Tested at White Sands Milanila Range 11 m	-		-			

Minor washup at stations 1, 7, and 11. Bonding separation of coating from substrate occurred at both lower corners of the specimen was disqualitied for bonding fellure; however, the material performed exceptionally well and should be investigated for similar application, if feasible.

Table XV. Detail Weight and Measurement Data RSA 64-18-A

				3	Wesgus 12576 (Cramo)	ramo							
Substrate 422.0			Ceating 86.1	86.1			Te∦.	Weight Loss			Perce	Dercentege 1 ces	
After Test 1 422.0	-			80,2			,	eri	er er				. 4
						Specin	Specimen Stations						0.0
Measurements	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	140. B	o o	N 16	1 22	27	No. 1 No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 11 No. 11 No. 12 No. 12
Development 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12											770.77	140. 1C	110.13
Delore Piring less No. 1	- 425	.423	. 425	.421	24.	. 423	.421 .424 .423 .425 .429 .420	. 429	.420	. 422	. 427	. 422	425
After Firing Test No. 1	.421	.417	. 420	.412	. 415	.419	.414	.414	.415	.412	415	414	2 5
Loss	- 000	006	043	- 009	009	. 004		-	. 005	, g	210		
				T.	ad as Unit	On de mar		:				•••	
					4	1 000000	willy office wiselfe hange it December 1964	7 7 1 0 S us	Scenabor.	1964			

Bonding separation of coating occurred between the material and substrate at upper left comes and lower left comes. The specimen was disqualified for bonding failure; however, the material performed exceptionally well and should be investigated for similar application, if feasible.

Table XVI. Detail Weight and Measurement Data RSA 64-19-A

milian manadan wai yangiyan kulan nyi melikumma ilmeriyan, melikummangan magani apiyi		- [Weight Data (Grama)	ten (Gram	(91						
Cubatrate 42.0			Coath	Coathu 108.0			Weig	Weight Lond			Porna	Pernantago Loss	
After Tost i 422.0				109.5				2.8	an an				2,3
	An annual contraction of the state of the st				es.	Specimen Stations	tations						
Meantoments	No. 1	No. 2	He. 3	No. 4	No. 5	No. 6	No. 7	370.8	No 9	No. 19	N3. 11	No. 1 Ro. 2 He. 3 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 · No. 10 No. 11 No. 13 No. 13	R. 13
Betwee Wiring Tree No. 1	428	,427 .429 .423	. 428	. 423	. 425	. \$30	. 433	.425 . 430 . 433 . 430 . 436 . 466	1 2.	, 486	. 630	. 427	. 428
After Piring Trat No. 1	484	1.20	.421	. 423	. 424	. 422	. 425	. 426 . 428 . 425 . 426 . 418	. 416	. 432	. 431	.415	419
Lose or Gain	064	000.	607	000.	001	000	008	000 888 294	003	004	190'	012	009
				Testad	Tested at White Eands Miscile Rungs 11 December 1954	Sands Mi	soile Run	Ma 11 930	ember 19	54			

Sonding separation of eacing from substrate excurred at upper right corner and lower ad becouse of bonding failure; however, the material performed emaptionally well and Lomazko: Nogligizio verbuy recurrod et secdor. No. 11. right correr of spontmes. Tyckimse elega.lif choude de investigated ?... similar application. Table XVII. Detail Weight and Measurement Data R&A 64-20-A

Feight Data (Grame

					-		-		THE RESIDENCE OF THE PARTY AND			to telementary commercial and select	
Substrato 422. 1			Coattag 87. 5	\$ 87.5			Wol	Weight Lons			Parce	Percentage Loss	
After Toot 1				81.2					6.3				7.2
makat jan imma vjers amagir v sadinistranjemismist detuniste ter usima premater kan sadinistranje					Spe	Specimra Stations	tions						
Messurements	No. 1	No. 2	No. 3	No. 4	140. 5	% . 6	No. 7	No. 8	No. 9	1 No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 11	No. 12	No. 13
Before Firing Tont No. 1	+23+	. 423	.493	.419	.423 .423 .419 .423 .425 .421 .425 .425	. 42.5	.421	.425	. 425	. 423	. 430	, 526	. 433
After Biring Test No. 1	-417	.416	.416 .418 .411	.411	.410	.410 .414 .414 .412 .412	.414	.414	.412	.437	. 420	615.	614.
Loan	-, 007	007	007 015 308	308	-, 013	011	007	011	-,013 -,011 -,007 -,011 -,013	00è	610	-, 007	012
				Tested	Tested at White Sands Minuile Range 11 December 1964	Sands Mil	seile Ran	ge 11 De	cember 1	\$ 96			

Remarks: Ecnding separation occurred between coating and substrate at lower right corner of specimen. faithre; however, the material performed exceptionally well and should be investigated for sim

Table XVIII. Detail Weight and Measurement Data RSA 64-21-A

				j).	Wolght Data (Grams)	drams							
Byhntrats 4.22. 0			Coatha	Coating 110.5			Weig	Weight Loss			Percent	Percentage Losu	
After Tost 1 422.0				93.4				۲.	.17.1			7	15.5
Attor Test & 422.0	,			₹				ě.	88.0			•	وي ر
					ν 	Specimon Stations	Stations						
Mewcurements	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13
Before Fixing Test No. 1	. 437	. 448	. 438	. 438	£.	.437	. 445	. 423	.439	. 456	. 430	. 433	. 434
After Fixing Test No. 1	. 425	. 432	. 436	: 426	. 433	.418	<u> </u>	. 448	. 437	. 440	. 422	. 425	. 442
Loss or Gain	012	016	-, 002	012	-, 010	019	001	. 025	-, 002	006	. 008	008	800
	·			Test	Tested at White Sands Missile Range 17 Desember 1964	Sands h	liseile Ri	age 17 D	ecomper	1961			
Before Firing Test No. 2, 3, 24	. 425	.432	. 436	. 426	. 433	.418		. 448	. 437	. 440	. 422	. 425	. 443
After Firing Test No. 2, 3, 24	. 388	÷	.352	÷	•	4	-0-	ė,	ģ	-0-	-0-	-0-	-0-
300	637	432	084	426	-, 433	418	****	448	437	440	446	425	442
			Touted at	White Sa	Tested at White Sands Missile Rango 20 April, 22 April, and 14 June 1965	le Rango	20 April,	22 April	and 14 5	une 1965			

Negligible pitting present on entire surface of coating. Fitting is uniform with no indication of severs failurs after subjection to first firing tests and the material disintegrated during these tests to the extent that carre was a 95.10 percent loss of coating from the substrate. Specimen disqualified after nring test number four. Romarts:

Table XIX. Detail Weight and Measurement Data RSA 64-22-A

Weight Data (Grams)

Debatrate 422.0			Coating	Coating 108.4			To fa	Weight Loss			Porc	Porcentage Loss	•
After Test !				101.3			-	•	7.1				6, 55
And the second s					42,	Specimen Stations	tations.						
Mousurements	. X	No. 2	No. 3	₩. ox	No 5	No. 6	No. 7	Mo. 8	No. 9	No. 10	Na. 11	No. 1 No. 2 No. 3 No. 4 No 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 13
Before Firing Test No. 1	553.	858	. 452	.454	. 458 . 452 . 454 . 412 . 455 . 470 . 466 . 462	. 455	. 470	.466		.466	. 446	. 458	. 473
After Firleg Tort No. 1	. 431	. 440	.463	.436	. 654	.454 .422 .452 .445 .431	.452	. 645	. 431	. 445	.452	**	**
Loss or Gain	022	018	013	620	. 01 1	.011033016021931	018	-, 021	931	-, 021	. 014	014	-, 029
				Posted	Tested at White Gands Minsile Range 17 December 1964	Sands Mi	asilo Ras	go 17 Da	ember 1	964			

Renarks: Wakup occurred at statem 11. Megligible pitting present on entire surface of coating. Pitting was not uniform and there was an indication of all all and articles and experimental and specimen was disqualified in favor of other materials. The material has merit and abould be considered for investigation for use in applications elimiter to this project.

Table, N. Detail Weight and Measurement Jata - RSA 64-23-A

Weight Loss Specimes Synthons Weight Loss Percentage Loss 10.18	Percentage Loss 40, 11 No. 12 452 . 443 . 456 . 405	Percei	No. 10 No. 11 No. 15 .440 .452 .443 .400 .446 .405 040006037	. 405	Meight Loss Weight Loss 11.5	Weight Loss No. 7 No439 .45 .393 .42	## (*#24ma) Weil Pactures Syntone 1 No. 6 No. 10 . 454 . 434 10 . 433 . 395 18 623 048	Valight Shata (Arrams) Walght Loss 11.5 10.5	Vol. 5 (0.1.5) Coming. 113.0 101.5 101.5 1474 1474 1475 1619 1619 1619	Gearmy . 474 . 439	Vol 1 No. 2 I I St. 3 No. 4 No. 1 No. 2 I I St. 3 No. 4 No. 1 No. 4 No. 4 No. 1 No. 1 No. 1 No. 4 No. 1 No	Volgbt in Commun, 113.0 101.5	######################################
			r 54	Tertod at White Bands Missile Range 17 December 1754	ngs 17 D	instile Ra	Bandy M	d at White	Torrto				-
		900 -	040	-, 041	. 033	046	-, 623		·. 025	353	(B.6	~. 014	क्षाका <u>क</u>
	.40	· #16	. 400	. 405	÷27°	, 393	. 433	. 420	. 422	. 439	. 489	. 455	atter wiring Teat Ma, A
	2	. 452	. 440	. 446	. 462	. 439	. 454		. 467	424.	Š.	. 365	Externo Virtug Task Inc. 1
12 No. 1	No.	No. 11	No. 10	No. 9	No. 8	No. 7	%io. 6	Na. 1)	No. 4	Féo. 3	7ia. 2	No.	Montapronongana
						;;/tions	ectones &	Spe					
10.18				5	11,				101.5				Arbair Tank h
8 8 9	intage L	Perce			Loss	Waight			0.113.0	Commit			Spirostutto 632. U
				İ			(Kirama)	labt Wota	N/a	***************************************		The second second second second second second second second second second second second second second second se	آها که ۱۶۰ طر پاکستان گرستان باید کامیان به جمعه باید و که کرد و که که در در کامیان کامیان کامیان باید کامیان ا

Remarks: Couldes chipped at needer annihila rical not he da

30

Table XXI. Detail Weight and Measurement Data RSA 64-24-A

				<u> </u>	Weight Data (Grams)	(Grams)							
Substrate 422.0			Ccoting 127. 6	327.6			ioW.	Weight Loos			Perce	Percentage Loss	
After Test 1				103.5				~	24. 5				19.20
					\$	Sperimen Seations	dions.						
Mescurements	No. 1	. No. 2	No. 3 .	¥o. ♣	No. 5	No. 6	No. 7	No. B	No. 9	No. 10	No. 11	No. 1 No. 2 No. 3 . No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 13
Before Firing Teut No. 1	. 450	.437	. 437 449 . 409	1	. 434 . 435 . 433 . 452 . 421	.435	. 433	. 452	.421	.440	. 446	.452	.461
After Firing Test No. 1	327.	.413	.413 .442	. 402	. 350	.350 .423 .406 .422	. 406	. 422	.413	. 407	. 438	.435	. 445
Loca	830	024	024 00Y	007	8	-, 012	-, 027	. 044 - 012 - 027 - 030 - 008	008	033	, 008	017	-, 016
	į			Teste	Tested at White Sand: Mist ils Range 17 December 1964	Sande M	isi ile Ra	nge 17 D	compar	*961			

Remarks: Specinoa lost 19, 20 percent of coading upon initial firing test. Specimen disqualuled due to the high percentage of coning lossa

intentaminana establicated de comparte de la comparte de la comparte de la comparte de la comparte de la compa

Table XXII. Detail Weight and Measurement Data RSA 65-25

				*	Weight Data (Grams)	A (Crama	_						
Subarrada 246.4			Costing	Coating -0. N/A			Wolght Loss	Loas			Porcent	Percentaga Loss	
After Town b 24% 6				-0- N/A				1.3	,			0.	0.73
The state of the s					85	Specimen Stations	Stations						
Monon common	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 1 No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 15	No. 13
Bafore Waing Tost No. 1	. 252	.251	.252	. 251	. 252	.252 .253 .252 .251	. 252	.252	.251	.251	. 253	252	.252
After Waing Tert No. 1	. 268	233	2.2	952.	797	. 264	. 265	. 264	. 261	. 264	,256	. 260	. 261
Cain	910.	. 002	000.	. 005	. 010		010. 110.	.012	.010	£00 °	.013	900	500.
				Teste	d at We s	Sands M	Hootle Ra	nge 13 Ja	Tested at Wk to Sunds Missile Range 13 January 1965	55			

Balidup of material ranged irom , 001 inch to 0.16 maximum. Extensive carbon and hurr buildup on epproximately 3 of specimen surface. Material is excessively brittle. Exitioness appears to have rogalised from bost emitting during missile biast. Specimen disqualified due to brittlensss. Rowarks:

Table XXIII. Detail Weight and Measurement Data RSA 64-26

					Weight Data (Grams)	ata (Gran	(gr						
Embetrate 258.5		_	Coattag	Coattag -0- N/A			We	Weight Loss			Percent	Percentage Loss	
			1	-0- N/A			ļ		33. 3			22	12.84
					S.	Specimen Stations	stions						
Moscurements	No. 1	No. 2	No. 3	No. 4	No. 5	%c. 6	No. 7	₹6.8	No. 9	No. 1 Mo. 2 No. 3 Mo. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 11	No. 12	No. 13
Dafore Flring Trut No. 1	300	162.	. 299 . 297	.297	262.	. 299	.295	.292 .299 .295 .291 .298	.298	. 295	. 303	, 298	.295
Ather Fixing Tact No. 1	· ·	. 000	000	, 300	000.	000.	C00.	000.	000.	000	000	900.	000.
Logo		Spectm	Specimen damaged to the extent that measurements would be meaninglens.	ed to the	extent the	t measur	omonts w	ould be m	enn'agited	•			
				Taste	Tested at White Sands Missile Range 13 January 1965	Sands M	iselle Re	ige 13 Jan	auary 196	χ			

entry fraction apprentication to percent destroyed during first firing tost. Specimen apprentised due to destruction.

Table XXIV. Detail Weight and Measurement Data - RSA 64-27

THE REAL PROPERTY OF THE PROPE

					A de 12 tear	Watter Lane (Grame)	1						
Sabatrats 273.4			Coating	Coating -0- N/A			Wei	Weight Loss			Percei	Percentage Loas	
After Test 1 266.7				-0- N/A				•	6.7				2.45
					Ş	Speckmen Stations	tations						
Measurements	No. 1	No. 2	Nc. 3	No. 4	No. 5	No. 6	No. 7	No. 3	No. 9	No. 10	No. 11	No. 1 No. 2 Nc. 3 No. 4 No. 5 Nc. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 13
Bafore Firing Test No. 1	152.	.254	.261	. 255	.258	.244	.258 .244 .255258	.258	. 249	.254	.236	.252	. 257
After Firing Test No. 1	. 451	. 259	.265	792.	. 271	. 254	272.	. 280	104	.271	. 247	.257	. 272
Gadn	000.	. 005		. 007	. 013	.010	710.	. 022	.015	.017	. 011	. 005	. 015
				Tester	l at White	Sands M	lestic Ra	nge 13 Ja	Tested at White Snade Missile Range 13 January 1965	ñ			

Romarks: Specimen supports heavy buildup of carbon deposit. Carbon scales easily, thereby providing a potential safety hanard to personnel footing. The specimen was disqualified due to carbon and scaling condition.

Table XXV. Detail Weight and Maasurement Data - RSA 64-28-SS

Walght Data (Grams)

				•									
Substrate 1132, 2		Ö	Coating -0- N/A	N/A			Wei	Weight Loss			Percentage Loss	ge Loss	
After Tent 1 1129.5			ġ.	-0- 14/A				2	2.8			0.25	25
					so.	Specimen Stations	Stations						
Monnyourour	No. 1	No. 2	Ho. 5	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 1 No. 2 Ho. 5 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 13
Before Fixing Test No. 1	.257	.258	.259 .257	.257	.257	. 255	.254	.257 .255 .254 .25± .257	. 257	¥52°	.257	.256	, 254
After Fling Test No. 1	. 263	. 268	. 288	.273	.277	. 272 · . 268	. 268	.275	172.	. 268	. 263	.271	192.
Galn	760.	010	.029	.018	020.	.017	\$10. 710.	. 021	.014	.014	900.	.015	. 027
				Testa	Testud at White Sands Missile Range 13 January 1965	Sands M	tecile Ra	nge 13 Ja	muary 19	. .			

Remarks: Extensive carbon buildup on surface of specimen. Carbon deposit scales easily, providing a potential safety basard to personnel focting.

Carbon separates easily from stainless steel surface at each corner and erbeine observed at those areas. Calculated weight of stainless steel reveals a serious weight problem. Specimen disqualified for expessive weight and cost.

Table XXVI. Detail Weight and Measurement Data - RSA 64-29-A

				× ×	Weight Data (Grams)	(Grams)							
Substrate 386.0	_		Coating 47.0	47.0			Weigl	Weight Loss			d	Parcentage Loss	
After Test 1 386.0				48.2				Õ	(Galn 1.2)				0.0
After Test 4 386.0				36. 1				0 ¥	10.9				23. 1
	 				ďg	Specimen Stations	ations						
Moasuremer .4	No. 1	No. 2	No. 3	No. 4	No. 3	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13
Before Firing Test No. 1	.273	¥12°.	.273	.274	.275	572.	275.	.274	.274	.275	.275	.275	275
After Firing Test No. 1	.274	.277	.274	.278	. 282	.276	. 282	.273	. 281	. 279	. 279	. 284	. 281
Loss or Gain	. 001	, 003	.001	. 004	. 007	., 001	. 607	. 003	. 007	*00	* 00 *	. 009	900.
				Tosts	Tested at White Sande Missile Range 4 February 1965	Sande h	Alsaile Rz	inge 4 Fe	sruary 19	99			
Before Firing Tret No. 2, 3, 24	.274	.277	.274	.278	. 282	922.	. 282	752.	. 281	.279	.279	. 284	. 281
After Firing Test No. 2, 3, 44	. 235	. 254	. 200	.241	.213	.241	. 222	. 238	. 224	.216	, 227	. 236	. 256
Loes	039	023	+.0	037	-, 069	035	050	039	057	063	052	053	-, 025
	نودنو سناو بداد			Teste	d at White	Sando A	fissile Ra	nge 20 A	ortl. 22 /	Tested at White Sands Missile Range 20 April, 22 April, and 14 June 1965	14 June 19	65	

Minor buildup of carbon and spiked burve prevelant on face of coating, resulting in an increased thickness of coating (negligible). After the first fixing test there was no visible tedication of any appreciable danuge. Appearance of material after four fixing tests is considered to be acceptable and is rated as third best parforming material tested. See Table VII for material characteristics. Remarke:

Table XXVII. Detail Weight and Measurement Data - RSA 64-30-A

Weight Data (Gramo)

							•						
Substrato 422.0			Coating 13.3	13.3			Wot	Weight Loss			Perce	Percentage Loss	
Atter Tost 1 422.0				15.4				~	2. 1 gain				0.0
					Spe	Specimen Stations	ntions						
Maneuremente	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. &	No. 9	No. 10	No. 11	No. 1 No. 2 No. 3 No. 4 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 13
Before Firlag Test No. 1	.272	.274	.272	.273	.274	.273	.274 .273 .274 .272 .275	. 272	.275	. 276	. 273	.275	. 272
After Firing Tout No. 1	.374	.278	.274	612.	.279	. 284	, 295	. 289	. 282	38€	.275	. 283	. 275
Gain	. 002	. 004	700.	900.	. 005	.011	. 021	. 027	. 007	300.	. 001	. 003	. 003
				Tosts	Tested at White Sands Missils Rangs 4 February 1965	. Sands M	lisells Ra	ngs 4 Foi	mary 19	65			

Remurks: Complete separation of coating in upper 40 percent of specimen. Host exhaust from missile resulted in substrate's being damaged at the left eids of the specimen in area where conting separated. Specimen disqualified due to coading separation.

THE STATE OF THE PROPERTY OF T

Table XXVIII. Detail Weight and Measurement Data - RSA 64-31-A

Weight Octa (Grams)

to begins the second or the second second second second second second second second second terms to the	the case of the same of the sa	MANAGEMENT AND AND AND AND AND AND AND AND AND AND	-	State of the state of the state of	T		-			AT THE PARTY OF TH		-	
Sabscrute 422.0		-	Cest	23 346. 2			We	Wolgh! Lows			Parc	Percentage I use	<u>.</u>
After Tast 1 222.0				2.43. 5					2,7				1.1
MAN, MANAN DI NAMBANAN DI MANAN NAMBAN MANAN MANAN MANAN MANAN NAMBAN NAMBAN NAMBAN NAMBAN NAMBAN NAMBAN NAMBAN	-				80	Spectmen Studiens	tučiense			A man partir " With a lumin selling personal selections	-		
		No. 2	No. 3	No. 4	No. s	Nti. 6	5. 5 N.4. 6 No. 7 No. 8	No. R	Nr. 9	No. 1 No. 2 ' No. 3 No. 4 No. 5 Nu. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 11	No. 12	No. 13
Refloye Airing Trust 140, 1	. 568	ė.	, 523	. 393	, 52 6 , 523 , 393 , 544 , 589 , 554 , 556 , 543	. 589	. 554	. 556	. 543	. 549	. 560	. 513	. 529
Altan Viring Testino. 1	095°	, 554	, 563	. 538	. 567	, 511	5567 , 511 . 554 . 518 . 54Z	. 538	542	. 537	. 562	. 512	. 526
Loss or Oak	503	. 078	. 038	~,055	. 023	., 248	.023 248 ,. 001	άχŲ	. 001	912	. 002	. 001	003
				Test	Tooled at White Sands Alksilo Range 4 February 1965	** Sands	'Aissilo R	ungo 4 F.	brusry 1	965			

Remaillo: Coulding chipped adjunent to uppor right and lower left test fluture mounting holes. Most fluting ci coulding tailure recting and substrate at left side of epecimen diequalified due to bonding failure and ciniping of museum.

Table XXIX. Detail Weight and Measurement Data - RSA 64-32-A

Weight Data (Grams)

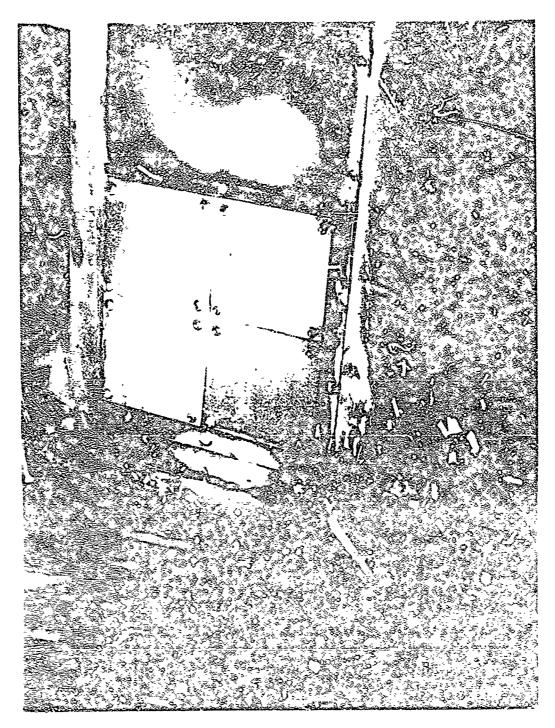
Substrate 422.0			Coating 155.2	155.2			A	Weight Loss			Per	Percentage Loss	***
After Test 1 422.0				9 38					75.2			,	48.45
					ξ.	Specimen Stations	e ano in						
Mossurements	No. !	No. 2	No. 3	No.	No. 5	No. 6	Ko. 7	₹ %	No. 9	No. ! No. 2 No. 3 No. 5 No. 6 No. 7 No. 8 No. 9 No. 10 No. 11 No. 12 No. 13	No. 11	No. 12	No. 13
Before Firing Test No. 1	512	. 48.8	. 436 . 437	.477	. 484 . 466 . 474 . 502 . 479	934.	474.	. 502	.479	. 506 . 501	. 501	. 500	. 543
Ather Breug Took No. ?	000.	600.	onu.	900.	000	000 . 000 . 000	000	000	. 000	000.	000.	000.	. 000
Loop in Gela	·	the frame	spacinger damaged to the extent that measurenent would be meaningless	रा कि	ctent that	measuren	cent woul	d be moa	ningless				
				Teate	d at White	M shaes	ineile Ra	nge 4 Fet	Teated at White Sands Missile Range 4 February 1965	τŭ			
Commission of the same and the	The second second		The same of the sa										

y sted from the substrate at the left side of the specimen, and the right side of the specimen. Beenvisua damaged to the exter, that micrometer measurements would be meaningless. The specimen trae directalities due to material seguration. Approximately 45 percent of the conting cap Gosting remaining as substrate to porcus. Renasrius

Table XXX. Application Weight Data

Specimen Number	Grams Per Specimen	Grams Sq/Ft Equivalent	Grams 80 Sq Ft	Pounds Required 80 Sq Ft
		T	A martinu maanty-maatantiinteeroomii are	
RSA 64-4-A	127.0	254.0	20,320	46.62*
PSA 64-5-A	98.4	196.8	15.744	34.69
RSA 64-6-A	90.8	181.6	14,528	32.00*
RSA 64-7-A	115.4	230.8	18.454	40.68
RSA 64-14-A	133.7	267.4	21,392	47 (3
RSA 64-15-A	100.0	200.0	16,000	35.25
RSA 64-17-A	97.8	195.6	15,648	34.47
RSA 64-18-A	86. l	172.2	13,776	30.35
RSA 64-19-A	108.0	216.0	17,280	38.07
RSA 64-20-A	87.5	175.0	14,000	30.85
RSA' 64-21-A	110.5	221.0	17,680	38,95
RSA 64-22-A	108.4	216.8	17,344	38.21
RSA 64-23-A	113.0	226.0	18,080	39.83
RSA 64-24-A	127.6	255.2	20,416	44.98
RSA 64-25	245.4	492.8	39, 424	86.86
RSA 64-26	258.6	517.2	41,376	91.16
RSA 64-27	273.4	546.8	43,944	96.81
RSA 64-28-SS	1132.2	2264.4	181,152	399.10
PSA 64-29-A	t	94.0	7,520	16.5 *
RSA 64-30-A	1	98.6	7,88:	17.38
RSA 64-31-A	216.2	592.4	47,392	104.41
RSA 64-32-A	155.2	210.4	16,832	37.08

^{*}Recommended inaterial based upon results of multiple firing tests



Lead to the second of Coating Specimens on MAULER Angelon Pod for Test

Figure 2. Coating Specimen RSA 64-4-A Before Test No.

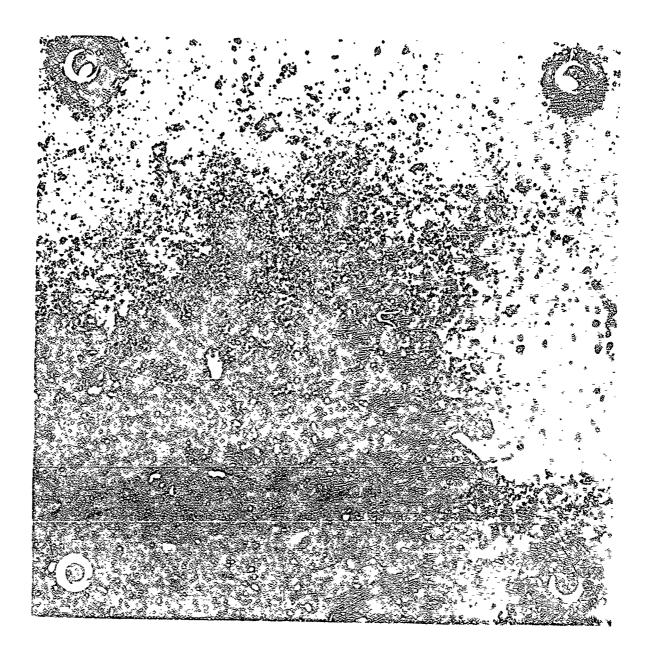


Figure 3. Coating Specimen RSA 64-4-A After Test No. 1

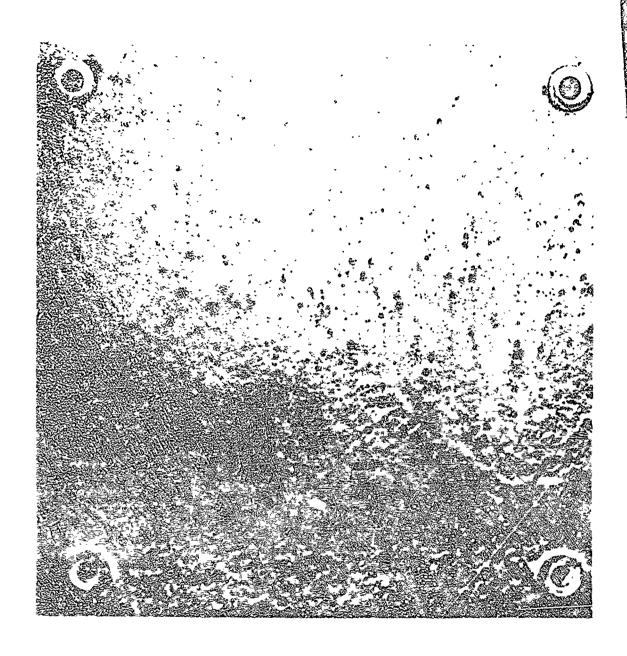


Figure 4. Coating Specimen RSA 64-4-A After Test No. 2

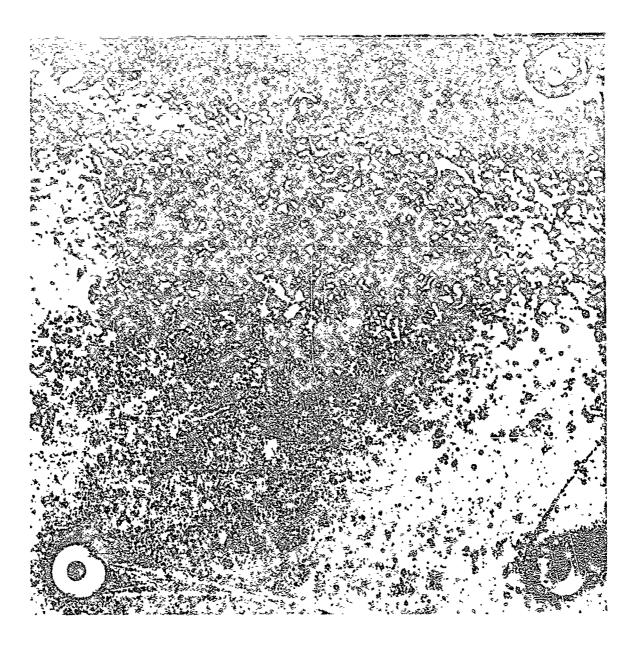


Figure 5. Coating Specimen RSA 64-6-A After Test No. 3

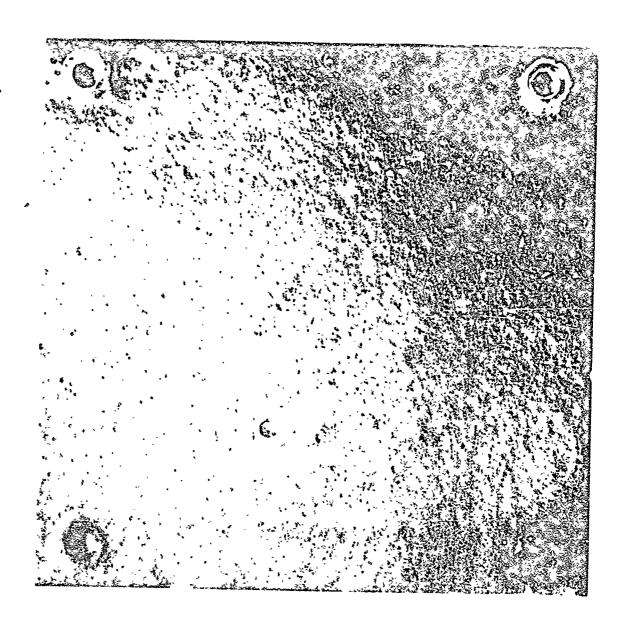


Figure 6. Coating Specimen RSA 64-4-A After Multiple Firing Test Nos. 4, 5, and 6

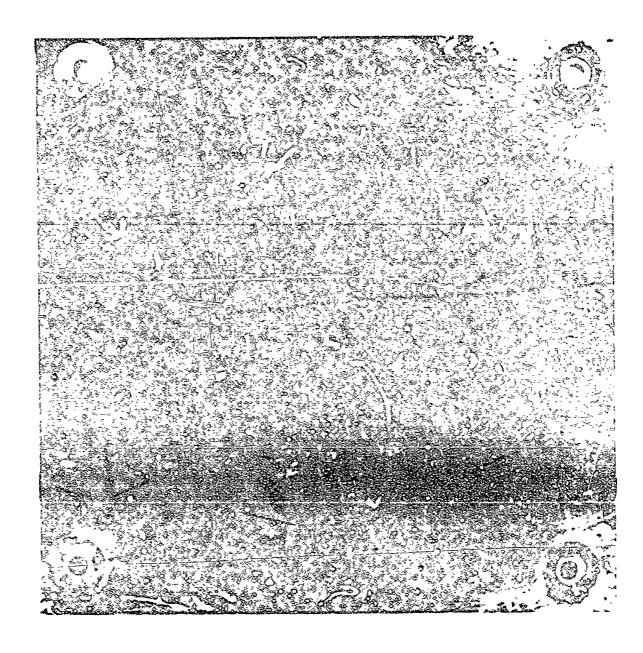
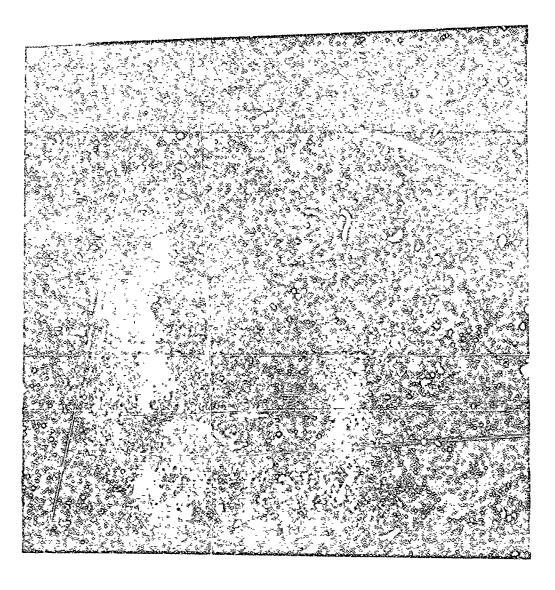


Figure 7. Coating Specimen RSA 64-5-A Before Test No. 1



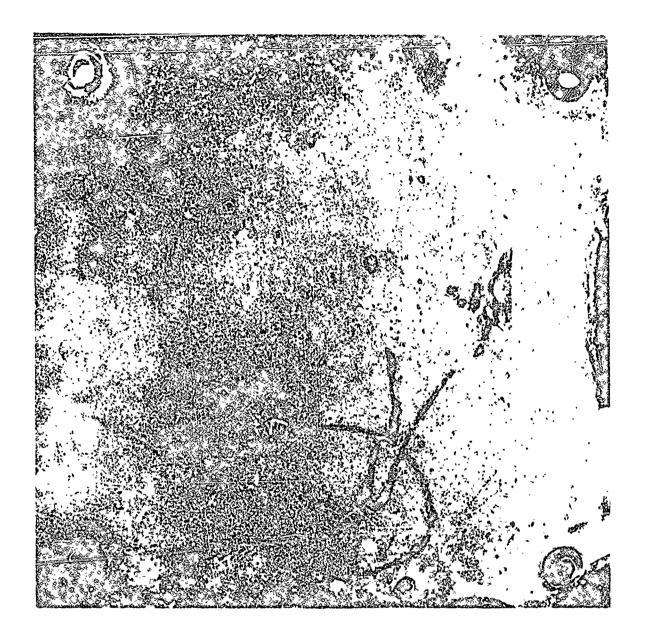
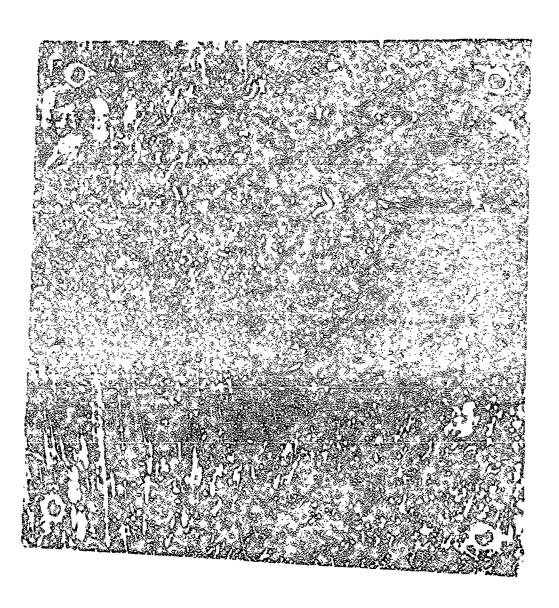


Figure 9. Coating Specimen RSA 64-5-A After Test No. 2



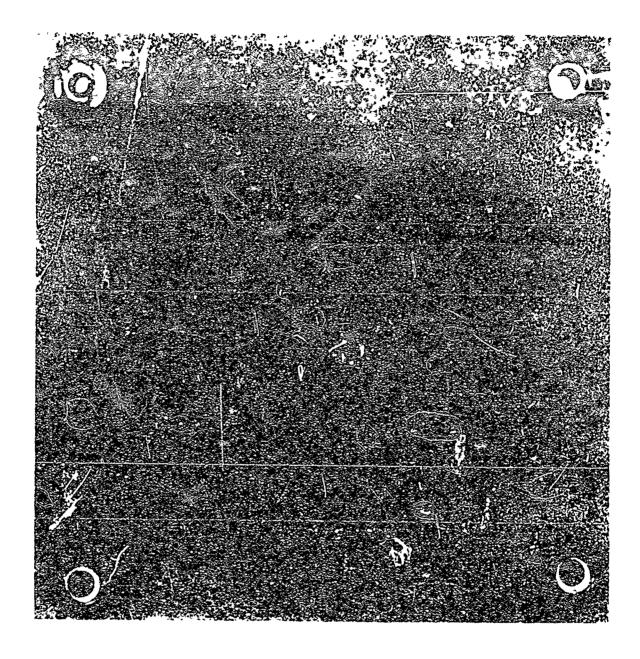


Figure 11. Coating Specimen RSA 64-6-A After Test No. 1

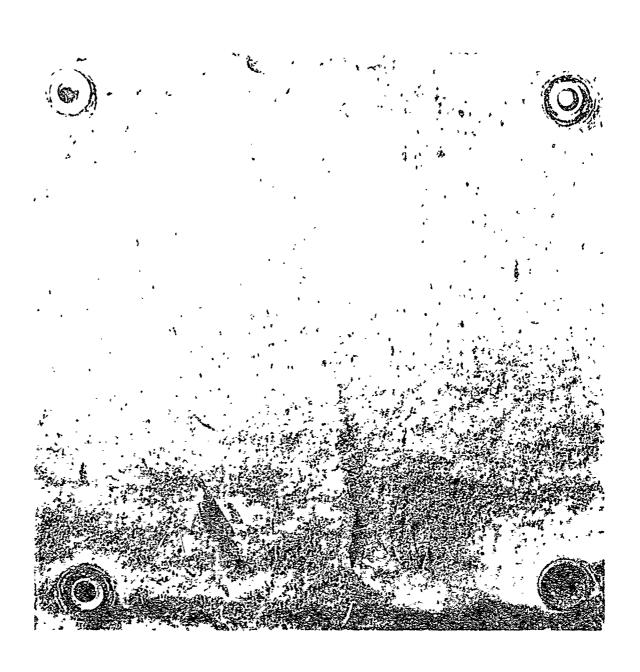


Figure 12. Coating Specimen RSA 64-6-A After Test No. 2

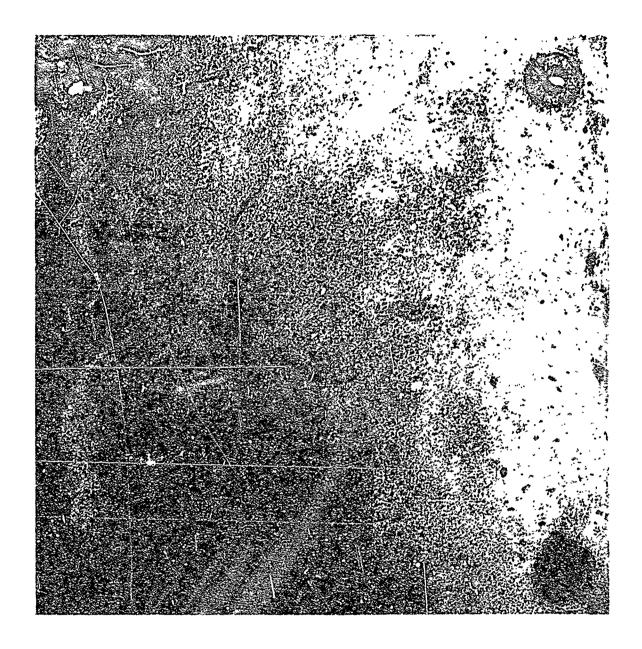


Figure 13. Coating Specimen RSA 64-6-A After Test No. 3

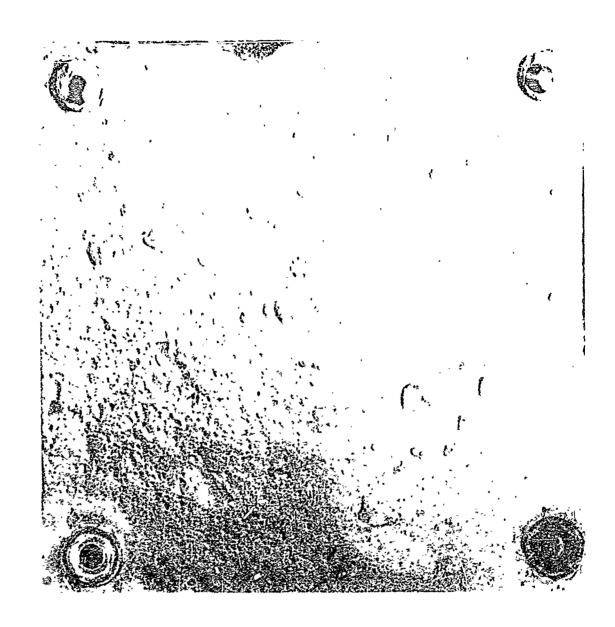


Figure 14. Coating Specimen RSA 64-6-A After Multiple Firing Test Nos. 4, 5, and 6

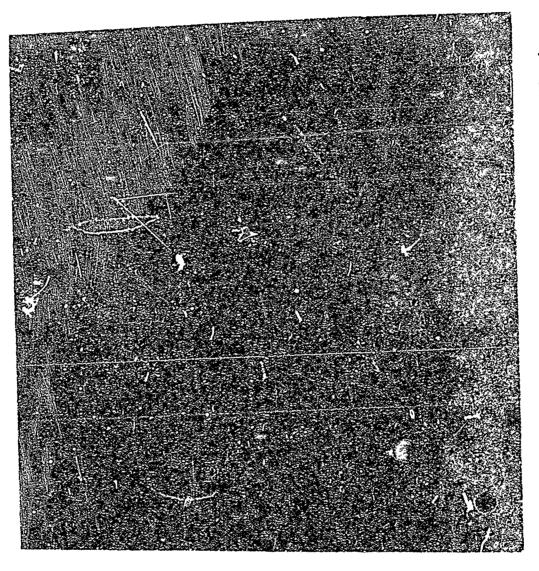


Figure 15. Coating Specimen RSA 64-7-A Before Test No. 1

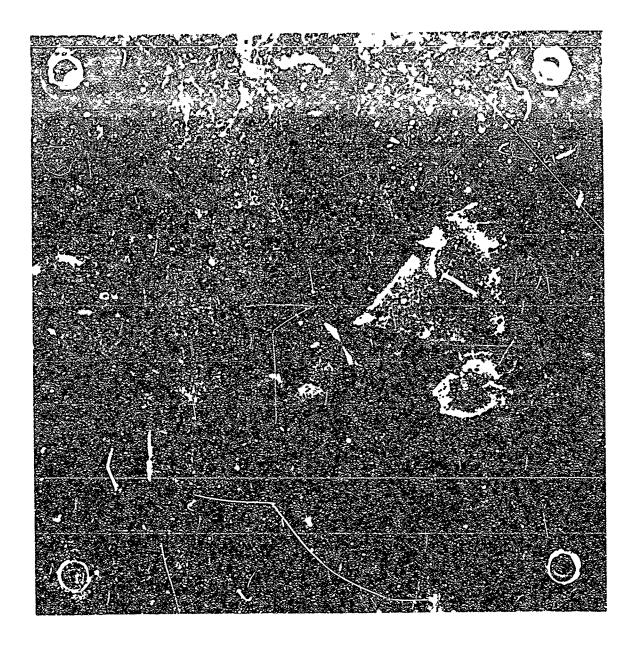


Figure 16. Coating Specimen RSA 64-7-A After Test No. 1

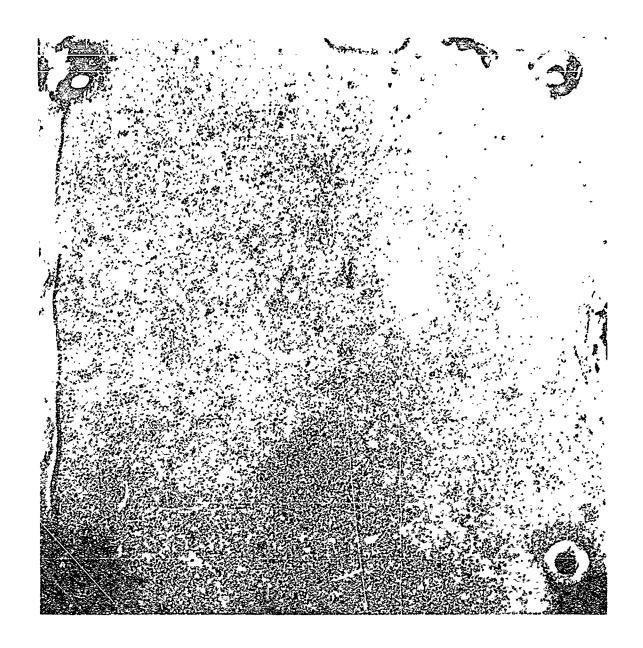


Figure 17. Coating Specimen RSA 64-7-A After Test No. 2

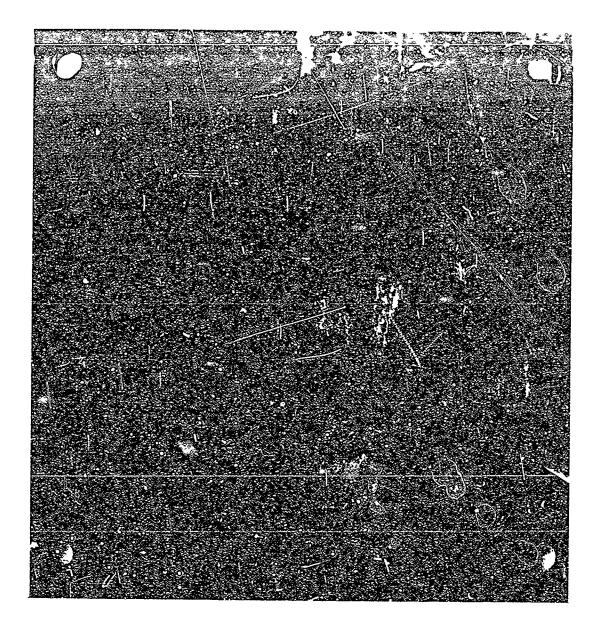


Figure 18. Coating Specimen RSA 64-14-A Before Test No. 1

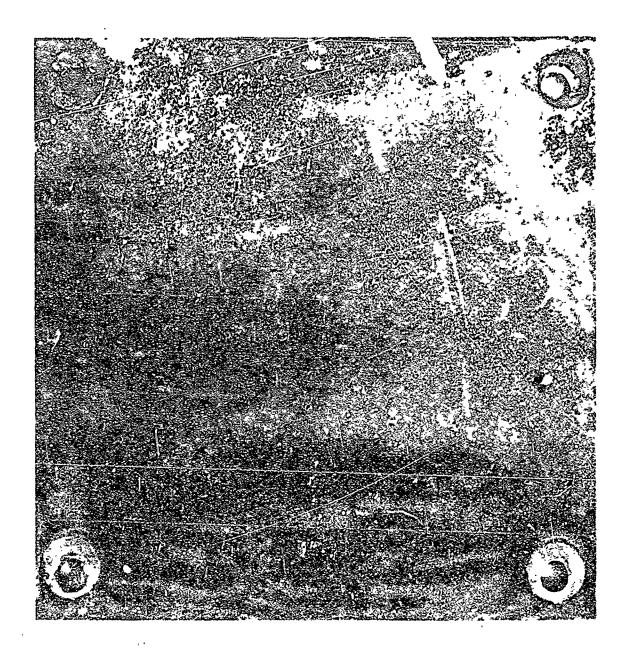


Figure 19. Coating Specimen RSA 64-14-A After Test No. 1

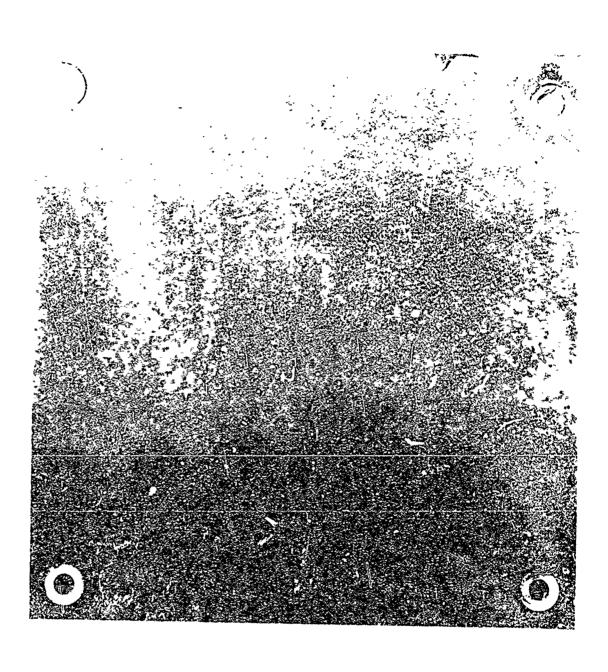


Figure 20. Coating Specimen RSA 64-14-A After Test No. 2

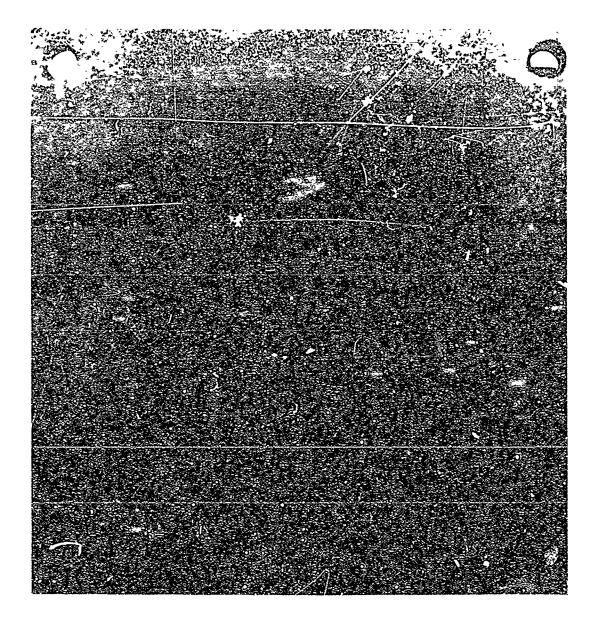


Figure 21. Coating Specimen RSA 64-15-A Before Test No. 1

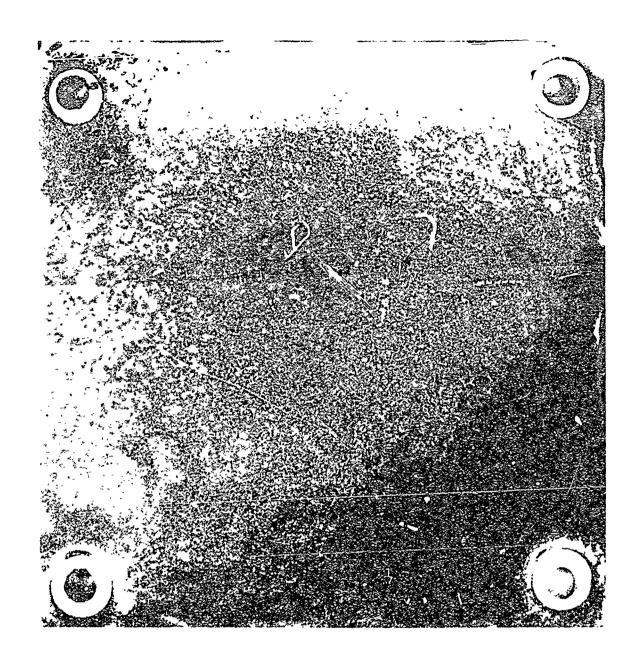


Figure 22. Coating Specimen RSA 64-15-A After Test No. 1

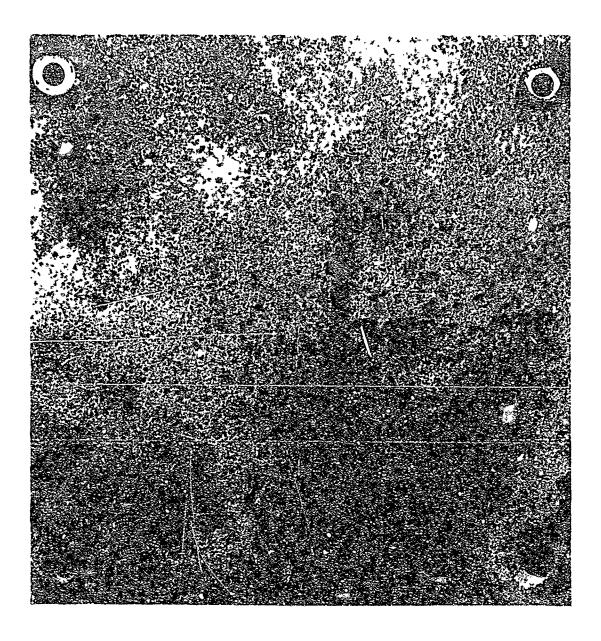


Figure 23. Coating Specimen RSA 64-15-A After Test No. 2

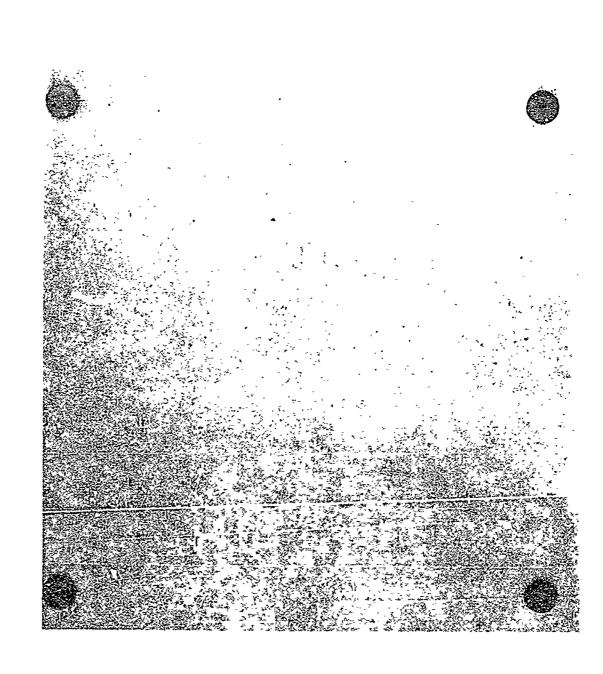


Figure 24. Coating Specimen RSA 64-17-A Before Test No. 1

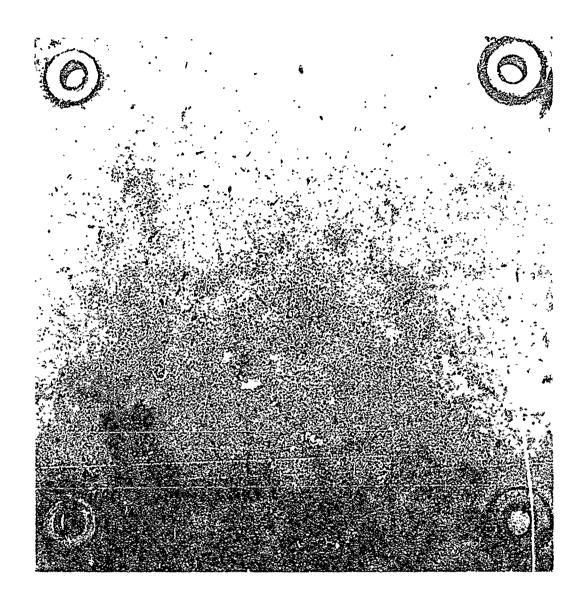


Figure 25. Coating Specimen RSA 64-17-A After Test No. 1

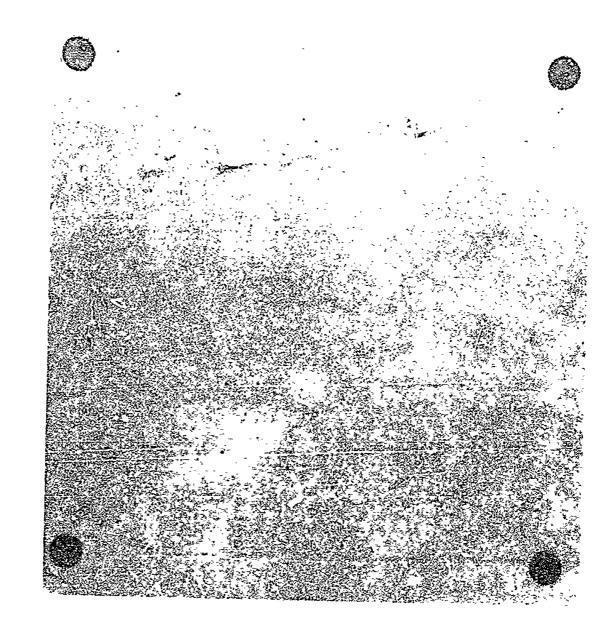


Figure 26. Coating Specimen RSA 64-18-A Before Test No. 1

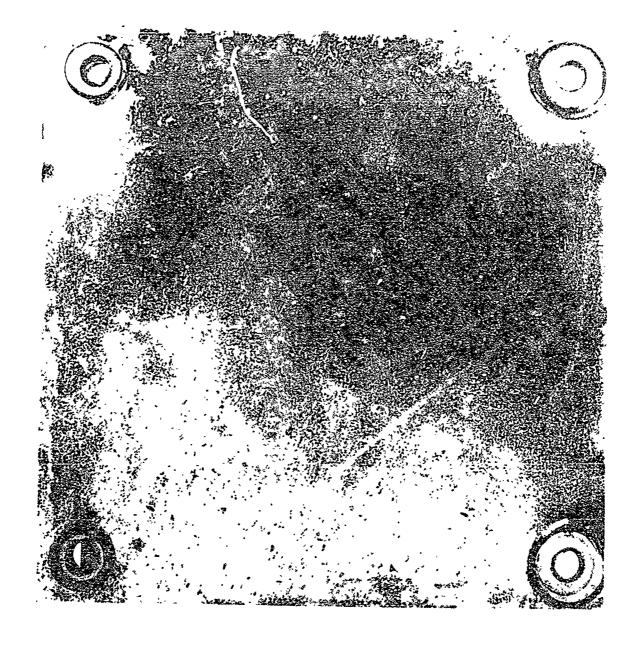


Figure 27. Coating Specimen RSA 64-18-A After Test No. 1

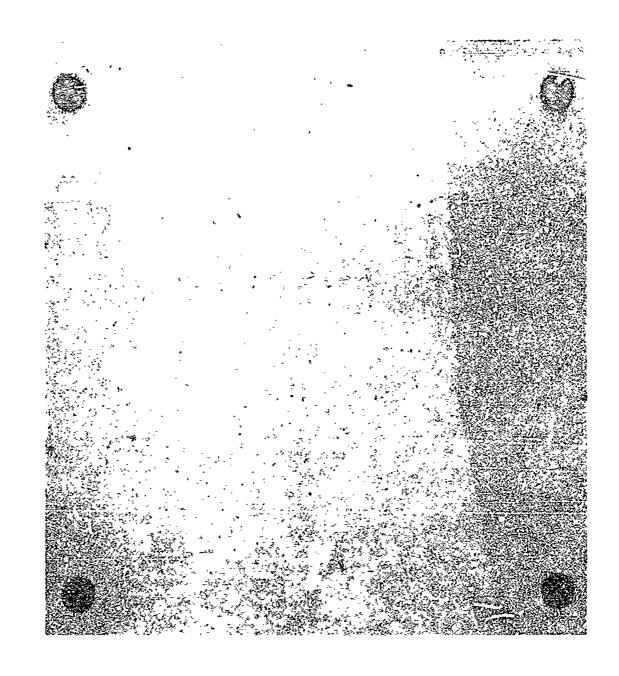


Figure 28. Coating Specimen RSA 64-19-A Before Test No. i

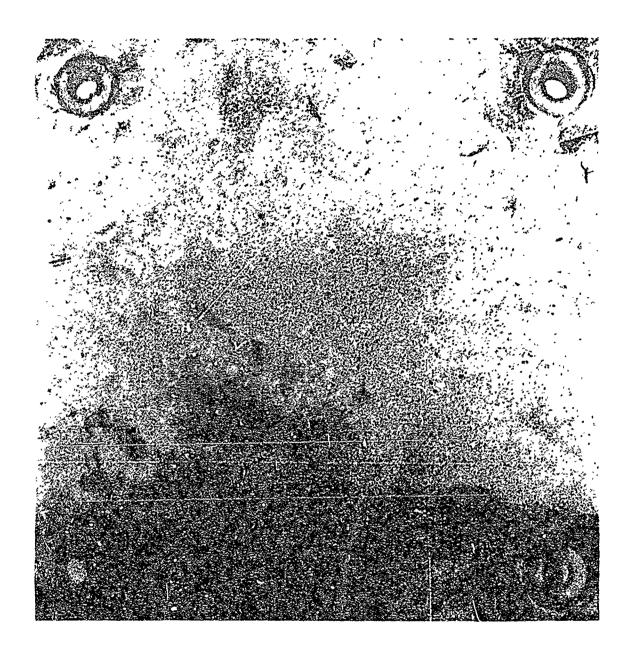


Figure 29. Coating Specimen RSA 64-19-A After Test No. 1

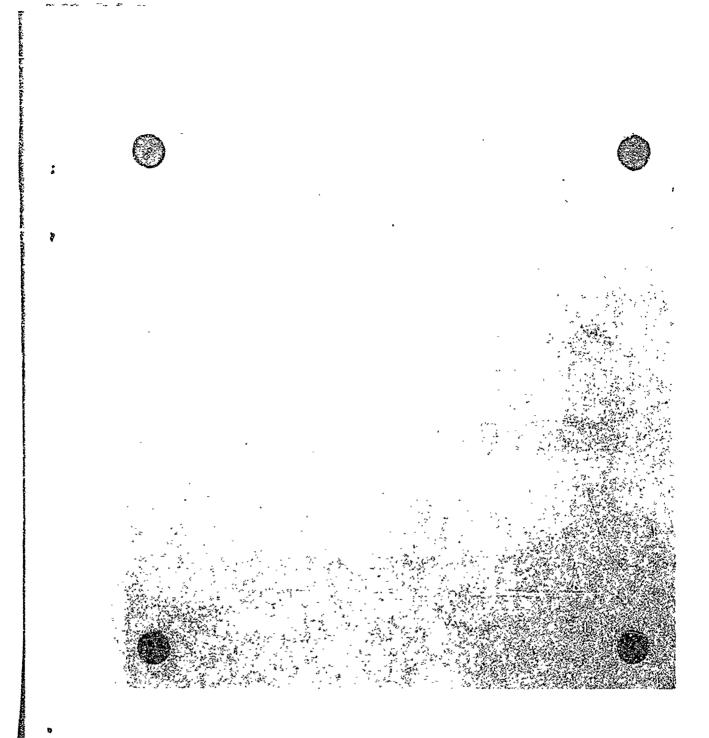


Figure 30. Coating Specimen RSA 64-20-A Before Test No. 1

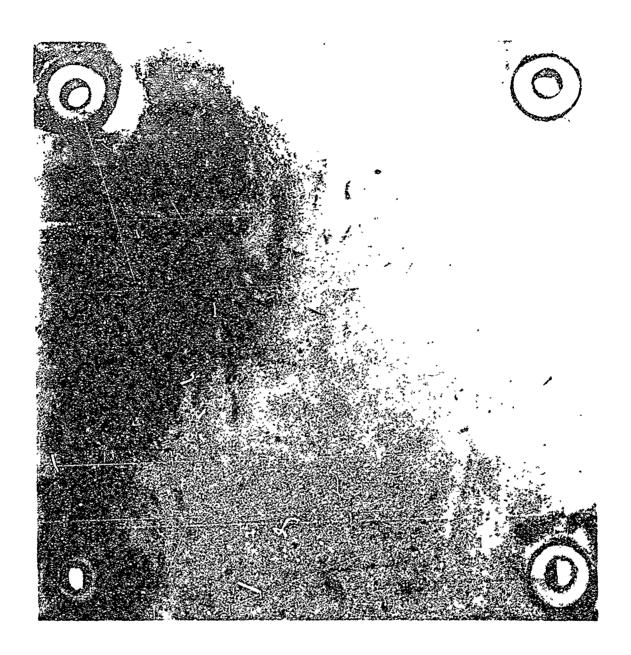


Figure 31. Coating Specimen RSA 64-20-A After Test No. 1

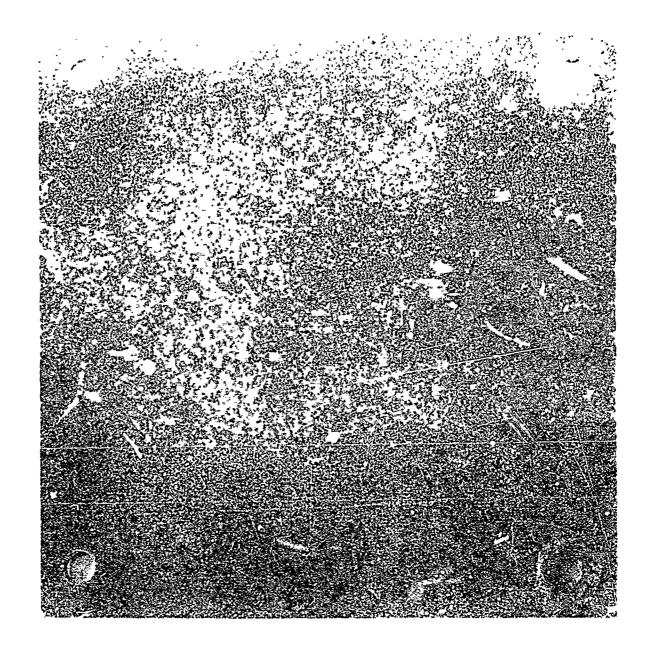


Figure 32. Coating Specimen RSA 64-21-A Before Test No. i

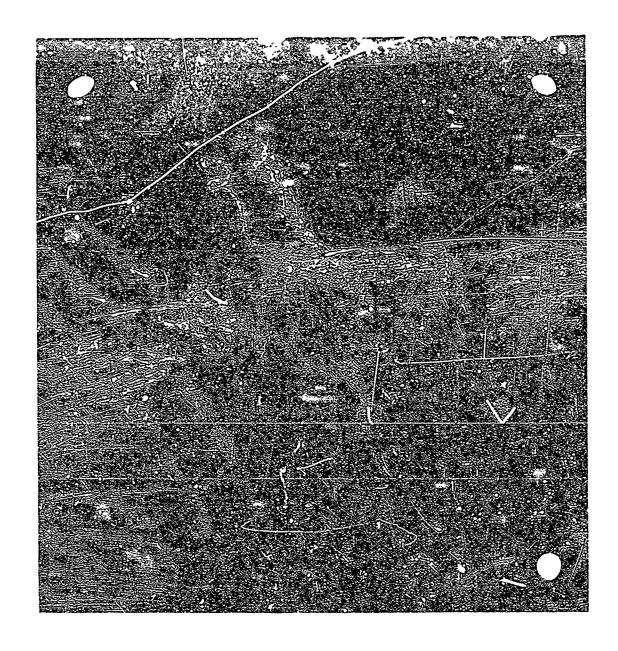


Figure 33. Coating Specimen RSA 64-21-A After Test No. 1

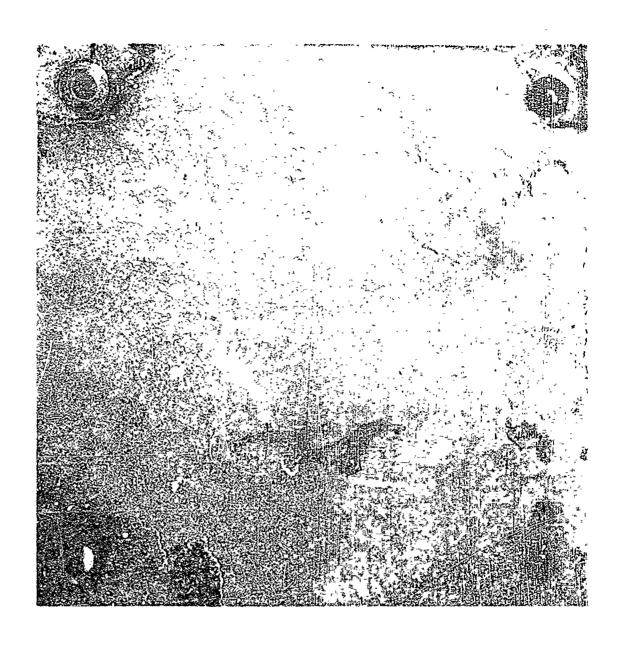


Figure 34. Coating Specimen RSA 64-21-A After Multiple Firing Test Nos. 2, 3, and 4

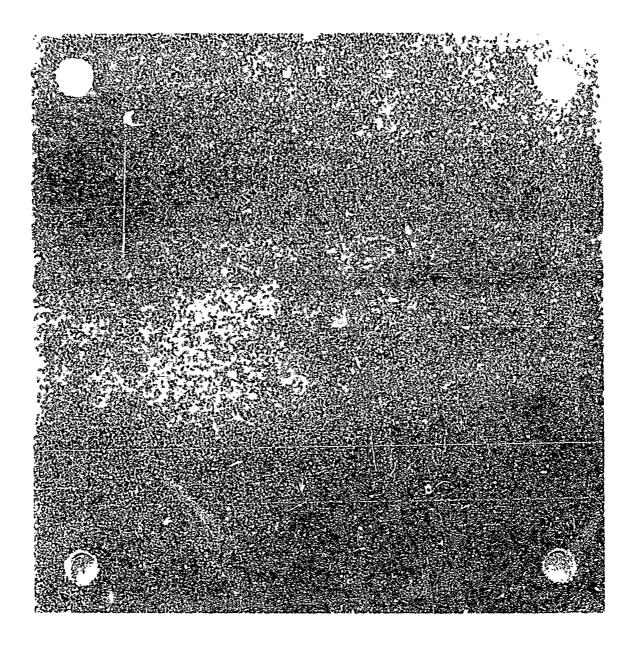


Figure 35. Coating Specimen RSA 64-22-A Before Test No. 1

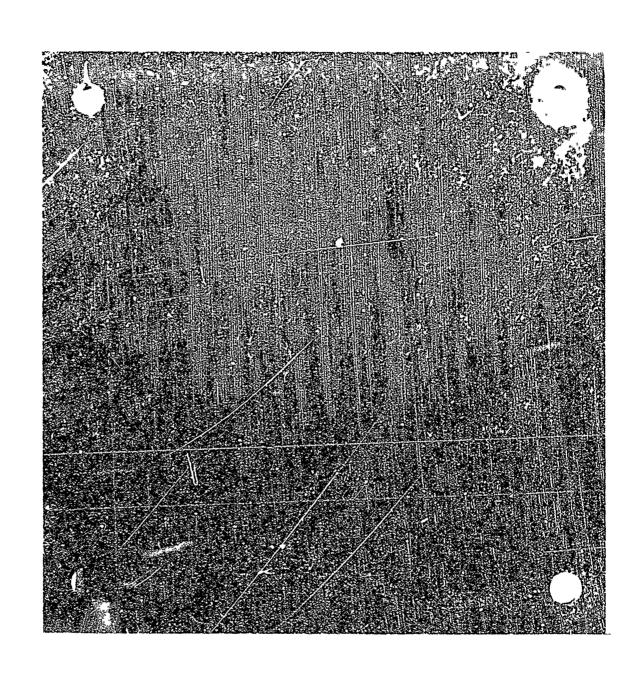


Figure 36. Coating Specimen RSA 64-22-A After Test No. 1

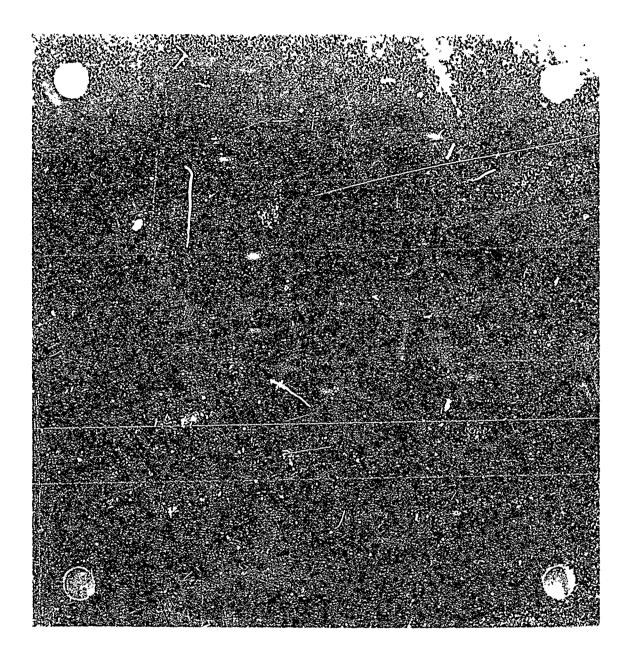


Figure 37. Coating Specimen RSA 64-23-A Before Test No. 1

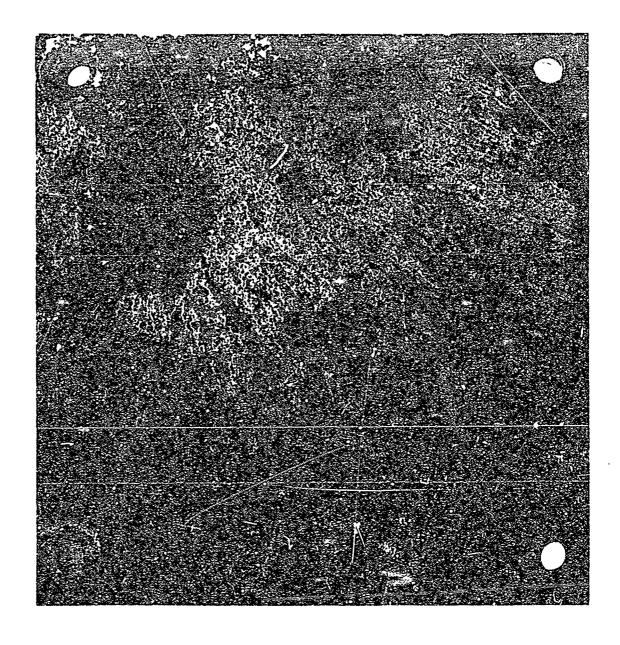


Figure 38. Coating Specimen RSA 64-23-A After Test No. 1

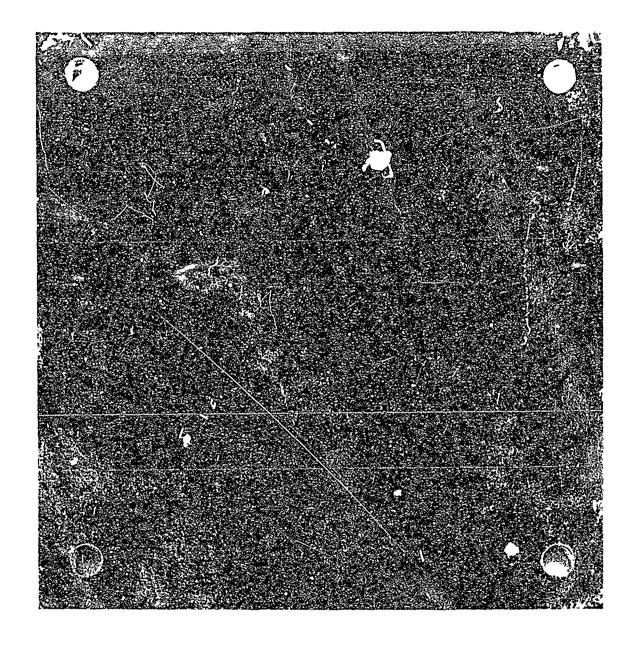


Figure 39. Coating Specimen RSA 64-24-A Before Test No. 1

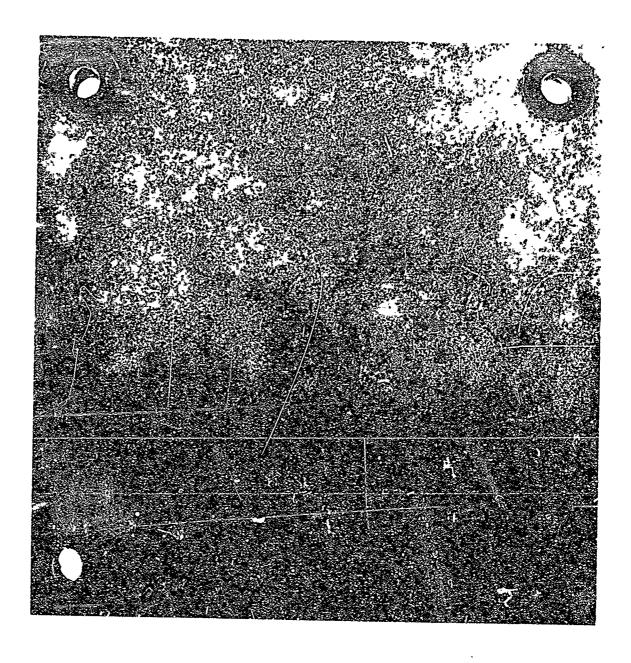


Figure 40. Coating Specimen RSA 64-24-A After Test No. 1

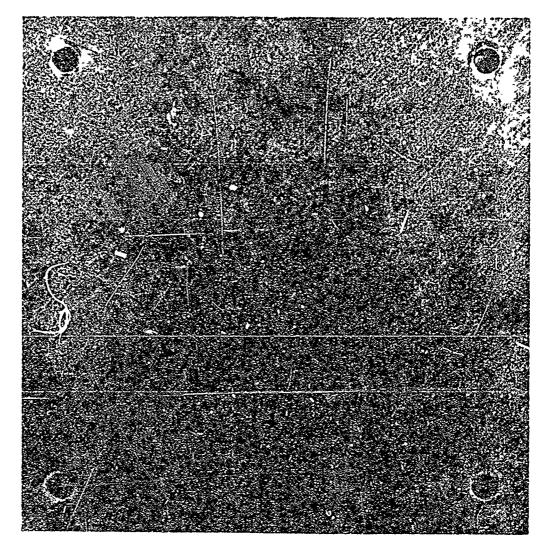


Figure 41. Coating Specimen RSA 64-25 Before Test No. 1

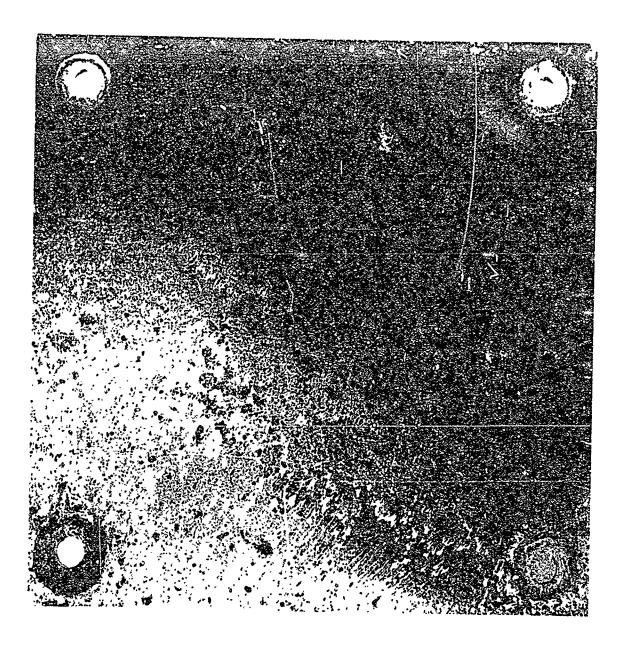


Figure 42. Coating Specimen RSA 64-25 After Test No. 1

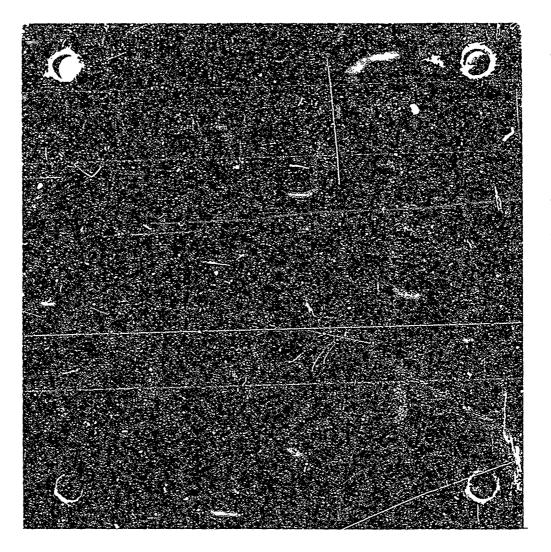


Figure 43. Coating Specimen RSA 64-26 Before Test No. 1

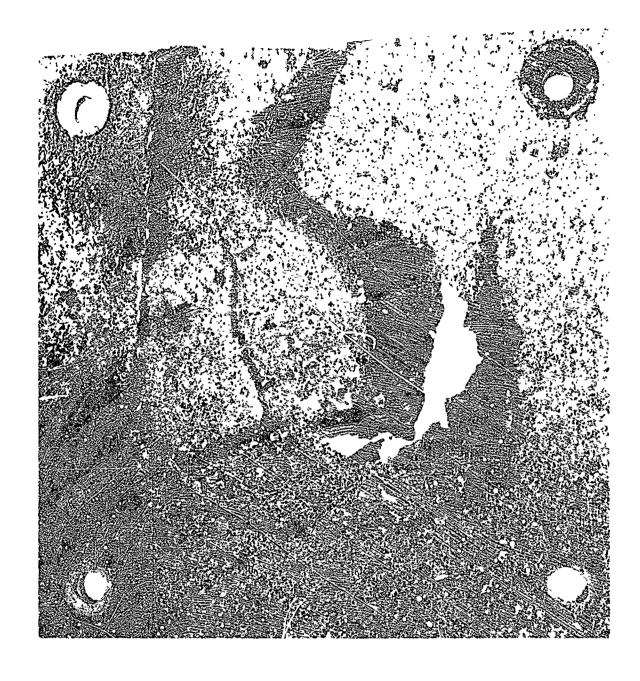


Figure 44. Coating Specimen RSA 64-26 After Test No. 1

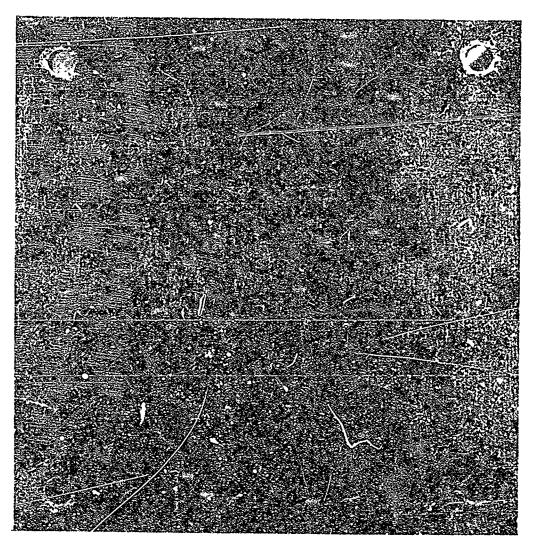


Figure 45. Coating Specimen RSA 64-27 Before Test No. 1

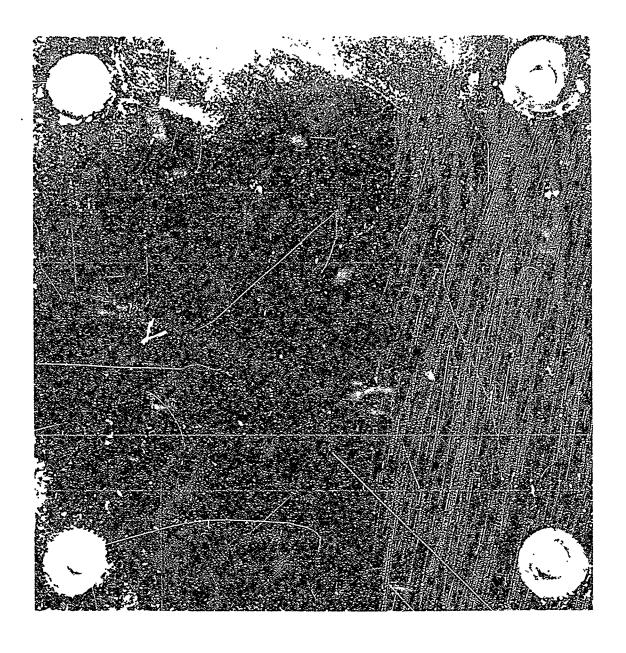


Figure 46. Coating Specimen RSA 64-27 After Test No. 1

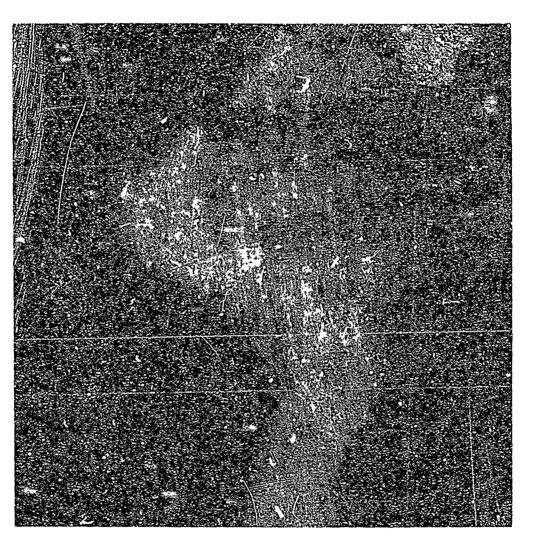


Figure 47. Coating Specimen RSA 64-28-SS Before Test No. 1



Figure 48. Coating Specimen RSA 64-28-SS After Test No. 1

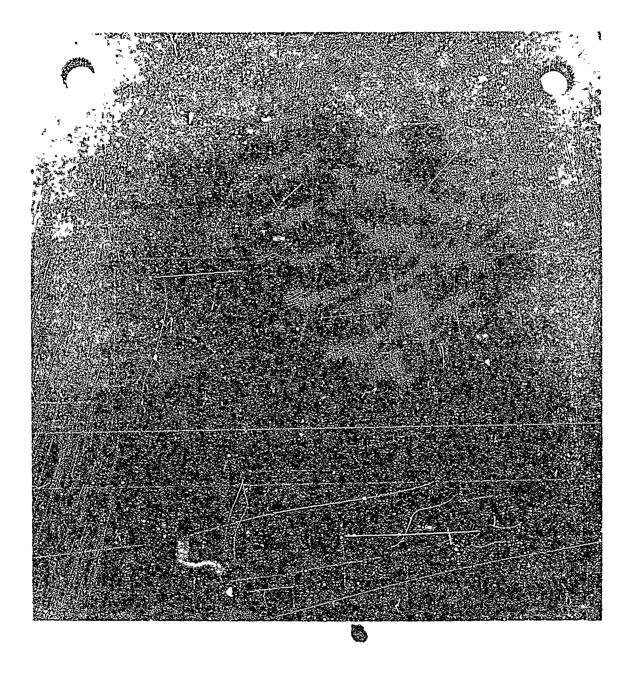


Figure 49. Coating Specimen RSA 64-29-A Before Test No. 1

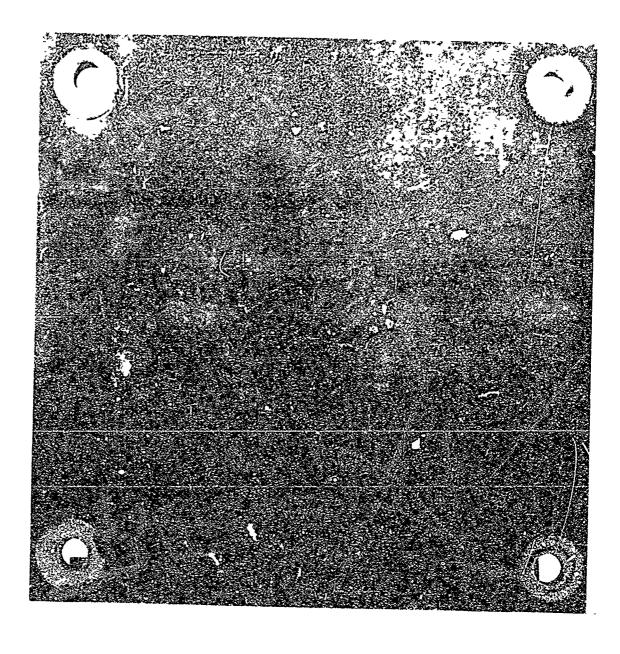


Figure 50. Coating Specimen RSA 64-29-A After Test No. 1

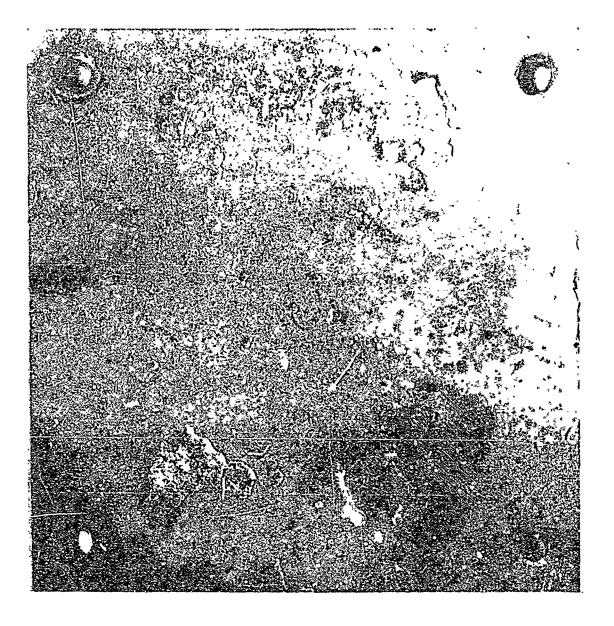


Figure 51. Coating Specimen RSA 64-29-A After Multiple Firing Test Nos. 2, 3, and 4

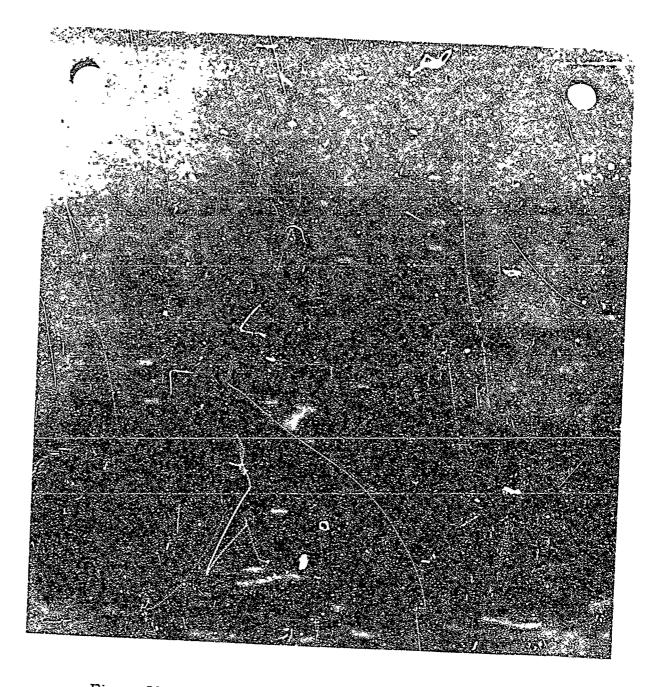


Figure 52. Coating Specimen RSA 64-30-A Before Test No. 1

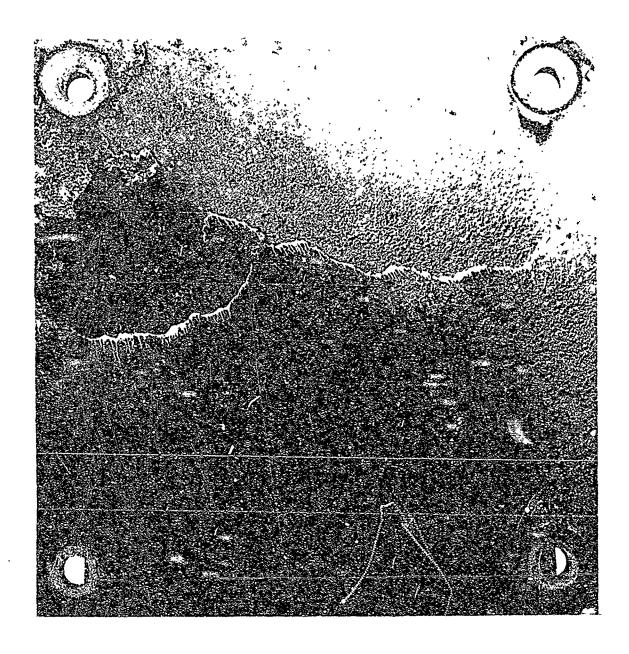


Figure 53. Coating Specimen RSA 64-30-A After Test No. 1

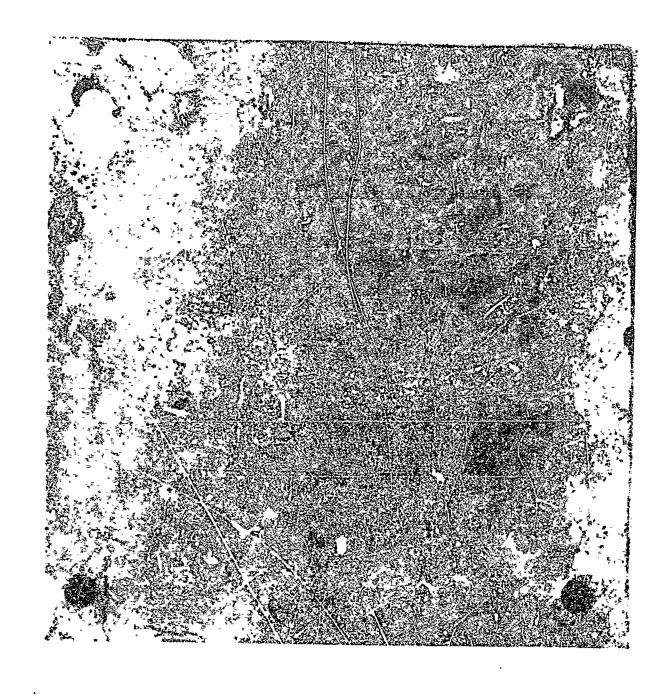


Figure 54. Coating Specimen RSA 64-31-A Before Test No. 1

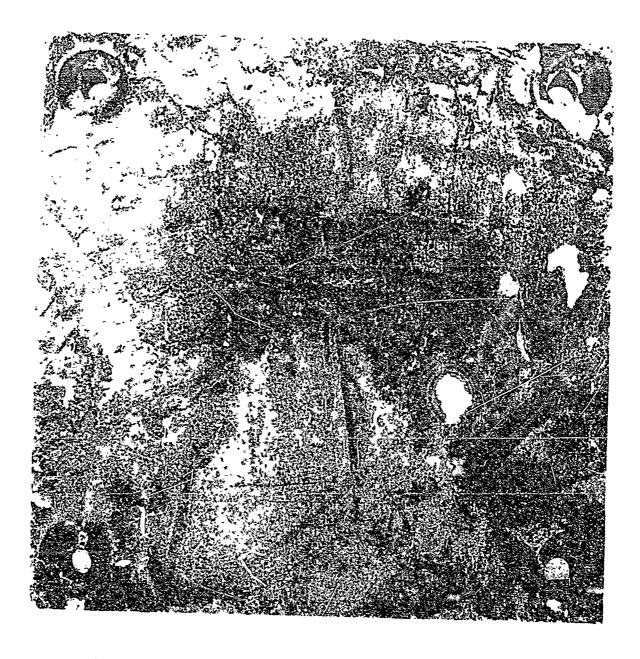


Figure 55. Coating Specimen RSA 64-31-A After Test No. 1

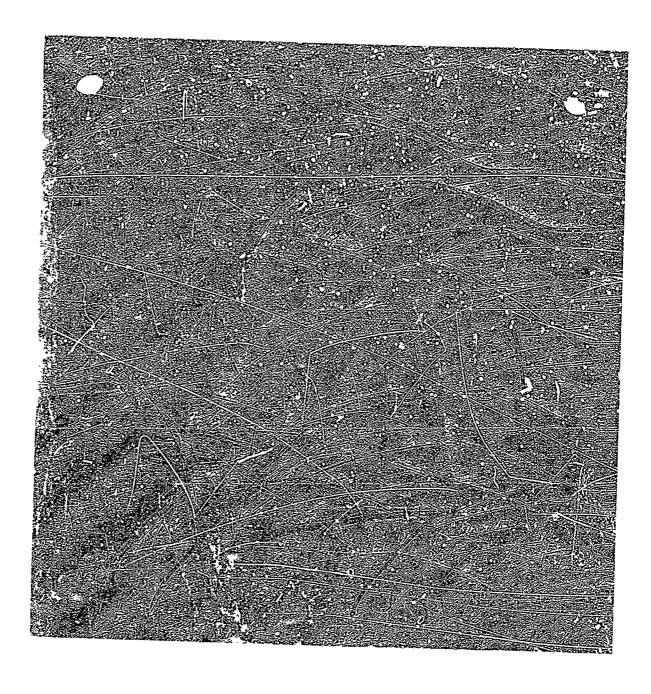


Figure 56. Coating Specimen RSA 64-32-A Before Test No. 1

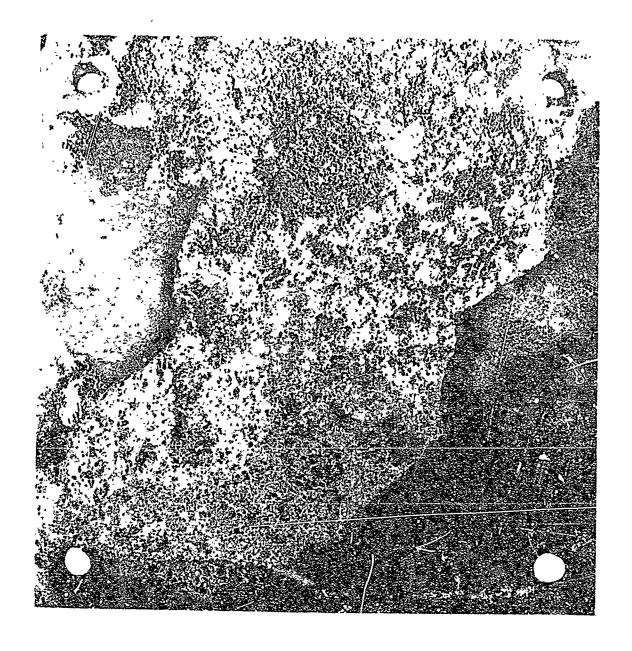


Figure 57. Coating Specimen RSA 64-32-A After Test No. 1

RSA RSA 64-6-A RSA 64-6-A

RSA RSA RSA 64-4-A RSA 64-7-A 64-5-A

STV-9 Firing 11 June 64
 12.0" Distance QE = 45"

2. CTV-10 Firing 22 July 64,12.0" Distance

Impingement point
1-1/4" above top

RSA RSA
64-4-A 64-6-A

RSA RSA
64-14-A 64-15-A

RTV-6 Firing Launch QE = 30°
 14.0" Distance

3 October 64 RSA RSA RSA RSA 64-18-A 64-20-A 64-21-A 64-22-A Impingement point 2-3/8". RSA RSA from center RSA RSA 64-19-A 64-17-A QE ≈ 43.70° 64-24-A 64-23-A Impingement point 3-3/8" from center

4. BTV-10 Firing Launch QE = 48°

14-3/8" Distance

11 December 64

5. GTV-13 Firing Saunch QE = 40.5° 13.0° Distance

37 December 61

Figure 58. Specimen Arrangements During MAULER Firings

Kontantantantan kanan kanan kanan janan kanan kanan kanan kanan banan banan kanan kanan kanan kanan kanan kana

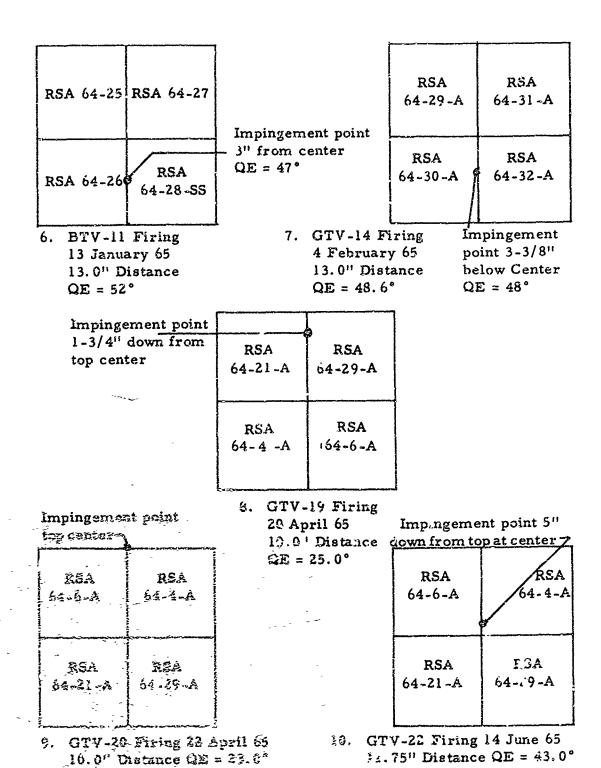


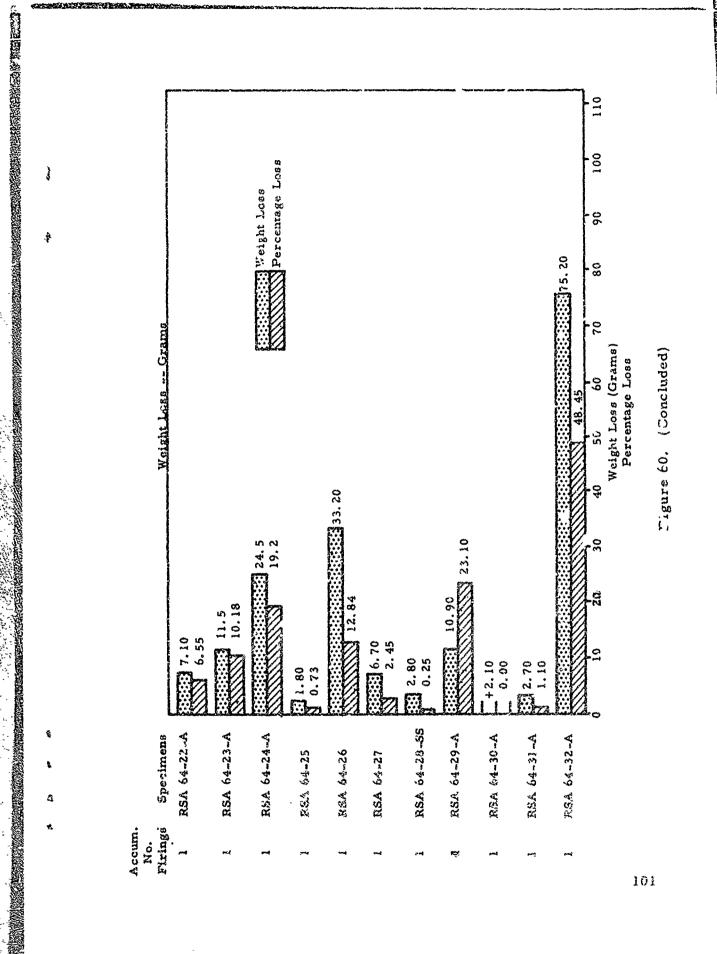
Figure 58 (Concluded)



Figure 59. Overall sew of Weat

No. Flrizzba	Specimens	WALER LA LOS WEST CONTRACTOR AND CONTRACTOR	t, are alleader telev attendaren elektrisk prop talvel staden byt de ser ekst.
Q.	RGA 64—44A		83.0
ત્ય	8.81 64.5.m		
9	REA 64-A	35. 20 37. 50	Weight Loss Fercentize Loss
.a 54	Kish. 64	25.30 29.30 29.30	
ы	165h 64-14-A	Continuent of the Continuent o	
~	M. S. S. S. S. A.		
; 4	RBA (44-17-18	23 2. 50	
≈ ≈;	KSiA, 64—18 m.h.	5.90	
7	Blit. 64.19.1	2. 31	
~∹	KBA 64-20 us	7. 20	
44	REA 64-21-A		1 25 1 C
		0 15 20 30 40 50 60 70 80 Woight Loon (Cranos)	90 100 110

Figure 50. Bar Chart-Wolght and Percentage Loss for Twenty-Two Coating Specimens Tested at



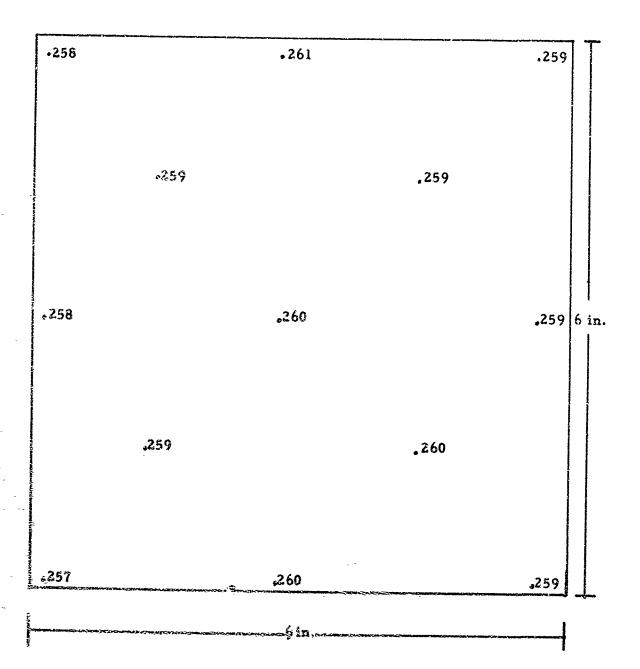
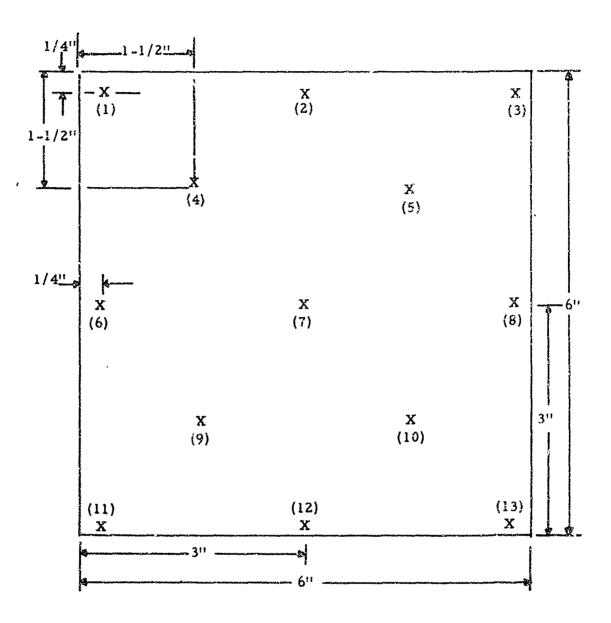


Figure 61. Measurements of Typical Aluminum Control Substrate



Format

All specimens were measured with the engraving on the back, right side up, and all specimens had the coatings facing upward:

The measurements were taken at 13 stations marked by $X^{\dagger}s$ on the above diagram.

Note: Station numbers shown in parentheses

Figure 62. Distribution of Specimen Measurement Stations

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PREPARED BY:

JACK R. WADE, JR.
Container Design Branch
GSE Lab, DRD

SUBMITTED BY:

CHARLES E. LYONS
Ch, Container Design Branch
GSE Lab, DRD

APPROVED:

WILLIAM C. WATSON

Director GSE Lab, DRD

Container Design Branch
Ground Support Equipment Laboratory
Directorate of Research and Development
U. S. Army Missile Command
Redstone Arsenal, Alabama